BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII.] New York, January, 1880. **[No. I.**

§ 1. **Proceedings of the Torrey Club.**—At a regular meeting of the Club held at the "Herbarium," Columbia College, Dec. 9th, the Vice-President, Mr. A. Brown, in the absence of the President, occupied the Chair. Eighteen members were present.

Mr. G. M. Wilber reported having found *Viola cucullata* in flower in the middle of November, at Flushing, L. I. Mr. N. L. Britton, exhibited a number of grasses and sedges. Among these were *Scirpus sylvaticus* L., found on Staten Island, and new to Southern New York; *Eragrostis Purshii*, Schrad., now growing plentifully in the streets in the upper part of New York city; and *Eatonia obtusata*, Gray, which Mr. Britton stated is quite common on Staten Island. Miss Elizabeth G. Knight reported the discovery by her, last August of the rare fern *Schizaea pusilla*, and of *Littorella lacustris*, both of which she found growing near the shores of Grand Lake, Nova Scotia. Miss Knight distributed specimens of these plants, and also of the fruit of *Salisburia adiantifolia* from Central Park.

Dr. Jarvis spoke briefly on the subject of galls, and gave an outline of a theory which he had formed in regard to their origin. On an invitation from the Club he signified his willingness to read a paper on the subject at the next meeting.

At a meeting of the Club, on Jan. 13, 1880, there were 29 members present. In the absence of the President and Vice-President, the Chair was occupied by Mr. O. R. Willis.

The Treasurer's report for the past year was read, and referred to the Finance Committee. Six new members were elected, and two additional names proposed for membership.

Mr. Henshaw exhibited a number of beautiful tropical orchids and euphorbias. Mr. Jos. Schrenk called attention to the presence of small tubercles on the roots of *Trifolium repens*, and briefly discussed their nature and functions.

Mr. N. L. Britton exhibited specimens from Staten Island of *Cornus florida* with double bracts.

Mr. Bicknell reported the discovery by him of *Hepatica triloba* and *Cerastium arvense* in flower on the 11th of January of the present year, at Riverdale on the Hudson.

The present being the Annual Meeting, the Club proceeded to ballot for officers for the current year, with the following result:

President, Dr. J. S. Newberry; *Vice-President*, A. Brown; *Treasurer*, Jno. J. Crooke; *Corresponding Secretary*, W. H. Leggett; *Recording Secretary*, G. M. Wilber; *Editor*, W. H. Leggett; *Curator*, P. V. LeRoy.

Owing to the lateness of the hour Dr. Jarvis signified his desire to postpone the reading of his paper on "Galls" till the next meeting.

§ 2. **Bryological Notes and Criticisms** by C. F. AUSTIN, *suggested by the careful study of a paper entitled "Descriptions of some New Species of North American Mosses; by Leo Lesquereux and Thomas P. James. (With a Supplement by W. P. Schimper.)" Proc. of the Amer. Acad. of Arts and Sciences, Boston*, 1879, *pp.* 133–141.

First there is an introduction, from which we quote:—"On a recent visit by Mr. James to Europe, he took with him not only specimens of the species here described, but also of many of those recently described in the Scientific Journals of this country, for the purpose of critically examining the whole in co-operation with Prof. W. P. Schimper, of Strasburg. This justly celebrated bryologist has cordially given his assistance in this review, and therefore secured to the descriptions of our species a higher degree of authority." Then follows the description of 17 species, 14 of which are claimed to be new. Upon reading the introduction, our expectations were raised to a high pitch, and we were prepared for a rich feast of bryological novelties. How we fared the sequel will show.

(1.) *Sphagnum Garberi*, L. & J. Hab. Florida, *Garber*.—The diagnosis of this "new" Sphagnum, except where it is manifestly wrong, is so very like Sullivant's description (Icones p. 5), of *Sph. humile*, SCHIMP., that there cannot be the slightest doubt of their identity. This view is fully confirmed by the examination of an authentic specimen kindly sent me by Mr. James, as well as of specimens collected in Florida by Capt. Donnell Smith and myself. Furthermore: Having seen many large beds of *Sphagnum rigidum*, SCHIMP., and examined scores of specimens, including numerous forms, all the way from British America in the North, to the Everglades of Florida in the South, it is equally plain to me that *S. humile* is only a local form of *S. rigidum*. The small form (*S. humile*, S. & L. Exsic. ed. 2 n. 18, and AUST. Musc. Appalach. n. 8), which abounds from New Jersey to Georgia, is characterized by nothing worthy of note except its smaller size. In Florida it runs into the *var. humile*. Any one who has watched the growth of Sphagna in their native beds for a succession of years, must know that some of the characters emphasized by authors are of the least possible account in separating them into species; e. g., the same bed may be all the true *Sph. cuspidatum* one year and all the true *Sph. recurvum* the next! clearly proving the latter to be a mere state of the former. This year a bed may be all the true *Sph. cymbifolium*, and next year all the *var. squarrosulum*, &c. The most opposite extremes of those characters which are plainly visible to the naked eye are apt to occur in the same species. An abundance of heat, light and moisture producing results very different from those produced by a deficiency of the same. *Sphagnum rigidum* varies considerably, yet I have always found it one of the easiest of species to determine. Probably the *var. humile* differs more from the type than any other of its forms. Yet its differences are plainly caused by the remarkably warm and moist climate in which it grows. In all the forms the margins of the branch-leaves are usually beset with minute blackish

bristle-like teeth, as in *Sph. cymbifolium* and its allies. They are also very narrowly margined, and their areolæ are furnished with largish more or less unequal indistinct pores. However, in the description of *Sph. Garberi*, both these last characters are erroneously said to be wanting. Furthermore, the chlorophyllose cells are said to be furnished with "numerous pores." Of course, this is an optical illusion; for pores belong only to *areolae* or air-cells. "The inflorescence," it is said, "is dioecious." This needs confirmation, for four reasons: 1. No part of the male plant is described. 2. All of the numerous specimens I have seen, if mature, are fertile,—this could hardly happen were the plant diœcious. 3. All the other forms of *Sph. rigidum* are monoecious. The 4th reason will become apparent to the reader further on in this review. [I have not searched for the male inflorescence because my specimens were all collected when the fruit was mature, by which time the antheridia in all Sphagna, (grown in warm climates at least) have totally disappeared.]

(2.) *Archidium longifolum*, L. & J. Hab. Florida. *Garber.*—I have seen no authentic specimens, the one sent me by Mr. James under this name being *A. Ohioense*, SCHIMP. But the perusal of the diagnosis and the habitat given, leaves no doubt of its being identical with *A. Lescurii*, AUST., first described in this Journal for Mar., 1877, (Vol. VI., p. 144). The authors affirm that the capsule and spores are as in *A. alternifolium*, BRID. Qualifying this remark slightly, they should have so extended it as to include all the other species of of the genus; and they might very properly have included the calyptra in the same category with the capsule and spores. (In 1868 I described and sketched this organ in a letter to Mr. Sullivant. I also described it in this Journal Vol. V., n. 7, p. 30, but to this day I am not aware that any one except myself and Mr. Rau ever saw it!) They also say "Antheridia 2." I have found as many as eight in one cluster.

(3.) *Bruchia flexuosa*, SCHWAEGR.—"Stems a half-inch or more in length. Inflorescence synoecious (*flos* bisexualis)." I have a large quantity of specimens of all the species of Bruchia which are common from New Jersey to Florida, all of which I have examined very carefully; but I never saw one with such long stems (exclusive of the leaves), nor did I ever see a bisexual flower except upon the minute *B. Carolinianae*, AUST., and even here the inflorescence is often autoicous.

(4.) *Bruchia Sullivanti*, AUST.—This is said to be autoicous. "Inflorescence monoecious, male flower gemmaeform," and in the very next line the authors quote Sullivant's Incones, T. 13, to substantiate the statement; yet it is both correctly figured in the Icones and described by me in this Journal, Vol. VI., n. 27, p. 143, as paroecious! (antheridia naked in the axil of a single comal leaf.) I have never seen autoicous inflorescence in any species that could be taken for either *B. flexuosa* or *B. Sullivanti*, except in extremely rare instances, all of which will be mentioned further on.

(4 *b.*) *Bruchia nigricans*, AUST. (It should read *B. nigrescens* (S. & L. AUST.; *B. flexuosa*, var. *nigrescens*, S. & L., an error of mine.) —Our authors consider this a "mere casual var. of *B. Sullivanti*,"

which may be true, but I never saw that species with such large spores. The dark color of the capsule is no doubt properly attributed by them to the plants having grown in a moist depression on the top of a mountain. The inflorescence is paroecious, and not autoicous as we are led to infer. My specimen (S. & L. Exsic, Ed. 2, n. 42) comprised only a few plants, but these were all very perfect!

No. 41 of the work just referred to, comprises three distinct forms, apparently collected in as many different places, and represents two if not three distinct species; as follows :—*B. Sullivanti* with paroecious inflorscence, medium-sized spores and smooth leaves ; *B. Donnellii*, AUST. with similar inflorescence, large spores and papillose leaves ; and *B. flexuosa*, SULLIV., Mosses of the U. S., with autoïcous inflorescence, minute spores and smooth leaves. It is probable the last mentioned is only a form of the first. I have never seen it from any other source. Its exact habitat is unknown.

(5.) *Bruchia brevicollis*, L. & J. Hab. S. Car. *Ravenel.*—The specimens sent to me by Mr. James under this name I had before from Prof. Ravenel, who informed me that he had never collected it but once. Sullivant also had it from Ravenel, and the figures in his Icones Suppl. t. 15, *Bruchia Beyrichiana*, HAMPE., were undoubtedly drawn from it. The inflorescence of *B. brevicollis* is not given, but we are erroneously led to infer that it is autoicous.

Having seen the specimens of Ravenel and Vasey, from which the description and figures in the Icones Suppl. were drawn, I have no hesitation in saying that they all belong to *B. Sullivanti.* Ravenel's represent imperfectly developed single plants, which one may find occasionally in colonies of *B. Sullivanti ;* or sometimes (rarely) growing separately. The calyptra is not longer than in the usual forms, but the capsule being shorter makes it appear so. Inflorescence, form and texture of the leaves, spores, &c., precisely as in the fuliy developed plants with which they grow. Vasey's Illinois specimens belong to very immature typical *B. Sullivanti !* All have paroecious inflorescence. Occasionally a plant may be found with a stunted appearance, a small short columned capsule and a large gemmaeform male flower, all of which are abnormal conditions ; while in all other respects the same plant will be normal.

(6.) *Weisia longiseta*, L. & J. Hab. Florida, *W. L. Foster.*—This is included in *W. viridula*, var. *australis*, AUST. Exsic. Suppl. No. 466, and appears to be a common form of this cosmopolitan and variable species in the extreme South. It is said to be dioecious. The remark, " It cannot be taken for a form of *W. viridula*, BRID.," I am obliged to dissent from ; for Donnell Smith and myself not only collected it plentifully in Florida, but also forms connecting it with the shorter pedicelled form with somewhat shorter less fissured peristomal teeth, which appears to be the common southern form of the species, occuring as far north at least as New Jersey.

(7.) *Weisia Wolfii*, L. & J. Hab. Canton, Ill. J. WOLF.—This is also said to be dioecious. It is another form of *W. viridula*, larger and a little more fully developed than the form given in Musc. Appalach. Suppl. n. 465, under *Weisia Rauei*, (vide this Jour., Vol. V., p. 20, for description). In fact Mr. Rau never sent me the delicate gym-

nostomous form which bears his name but once; but has frequently sent specimens from the same spot collected since, which are almost identical with Mr. James' specimens—*monoecious* inflorescence and all. But I find no male plants in specimens sent by Mr. Wolf, which are nearly identical with No. 68 of Musc. Appalach. The forms of this species are all transient, as any one must know who has watched it grow. I have found its widest possible extremes growing from the same patch during but two successive years.

The inflorescense in this species, usually autoicous, is often obscure. I have often examined specimens in which I could find no male flowers, but have no recollection of ever seeing a specimen that contained no female flowers. (No. 69 of Musc. Appalach, forms no exception to this rule, for it plainly belongs to some other species. It appears to be a *Gymnostomum*.)

Weisia viridula, BRID., not only includes both the foregoing "new species," and both *W.* (*Gymnostomum*) *Rauei* and *Brandegei*, AUST., but several other about equally well characterized forms, which I am not aware have yet been described as new; and the characters in which *W. mucronata*, BRUCH, coincides with one or another of the forms of *W. viridula*, are too striking for me to accept it as a distinct species; although it is so regarded, I believe, by all the eminent authorities of Europe. In matters of this kind I have invariably found Nature to be the best authority.

(8.) *Ptychomitrium* (*Notarisia*) *pygmaeum*, L. & J. Hab. Near the Neosho River, Kansas, and at Bolivar, Missouri, *E. Hall*.—Not being able to get an authentic specimen from Mr. James, I proceeded to study carefully the description; and soon became so strongly impressed with the idea that it was at most only a form of *Pt. incurvum*, SCHWGR., that I wrote to Mr. Hall for samples of the original specimens. He generously responded with two specimens from West Mo. One from Vernon Co., which proved to be true *Pt. incurvum*, and the other from Bolivar, one of the localities given for the new moss. This is not smaller than the true *Pt. incurvum*, as it occurs in this region (Closter, N. J.), *nor are the leaves different in a single, most minute particular;* but the pedicels are a little shorter and the capsules darker and more solid, narrower, and usually more acute at the base. All the capsules are immature and shrivelled, and have a more or less diseased appearance. Even after long soaking I found it impossible to swell them out; or to remove an operculum without injuring the peristome, which, so far as I could see, is not different from the imperfectly developed peristome of the typical plant. The same is true of the annulus. As for the "marked neck of the capsule extending one-third its length;" I find it to be but a trifle more marked than I have usually seen it in immature capsules of typical *Pt incurvum;* in fact, upon long soaking and under slight pressure, it is, in the best developed capsules, not more marked than it is shown to be in Fig. 2 of Sullivant's Icones, T. 39. The Neosho River specimens, received since the above was written, differ from the last only in having all the capsules very old, and the calyptras all very young.

(9.) *Fissidens Garberi*, L. & J. Hab. on the bark of trees, Florida. *Garber*.—I have not been able to secure a specimen from

Mr. James; but in Mar. 1877, Capt. Donnell Smith sent me from the Indian River, Florida, a little Fissidens which I described at the time as new, and sent a specimen to Mr. James. He replied that he already had it diagnosed and ready for publication, under the name of *Fissidens Garberi;* so there can be no doubt of the authenticity of my specimens. I have since found it myself in southwest Florida, on shells, rotten wood and roots of trees. It also occurs on coquina rocks. Here again the authors are at fault with their inflorescence. They say "flos bisexualis." I have invariably found the species pseudo-dioecious, e. g., as in *F. obtusifolius*, WILS.

(10.) *Fissidens Floridanus*, L. & J. Hab. Florida, *Garber.*—I have not been able to get any clue to this moss. Mr. James informs me that he has none of it; having left his only specimen with Prof. Schimper. We are not told whether it grows on the ground or elsewhere. The leaf is said to have a "large pellucid border." This character belongs to but two species in this country, known to me, and both of them are common in Florida. They are *F. decipiens* and *F. adiantoides*,—the former dioecious, the latter monoecious:—(both have lateral inflorescence.) In one place the inflorescence is said to be "monoecious, with the male fls. terminal on longish lateral branches, and the female fls. axillary on the middle of the stem." In another place, "the species," it is said, "is related to *F. osmundioides* HEDW. [which is dicœcious!] by its monoecious, terminal inflorescence." In one place the capsule is said to be oval-oblong and cernuous;" in another "oblong-cylindrical and curved." Upon the whole, the ambiguity of the description, together with the paucity of the specimens, would seem to exclude this "new moss" from the category of things having an actual existence.

(11.) *Cryphaea pendula*, L. & J. Hab. Florida, *J. D. Smith.* (*C. glomerata*, var., AUST., Musc. Appalach. Suppl. n. 526.)—In the first place I believe the specific name is not well chosen; for, if I am not greatly mistaken, the plant is the reverse of pendulous. In the second place, excepting that the leaves towards the ends of the usually longer stems are longer acuminate, I am unable to find any difference between this and the common plant which is sometimes found as far north as New Jersey, and which is known as *Cryphaea glomerata*, SCHIMP. In the form of the ordinary stem-leaves, areolation of the same, perichaetial leaves, capsule, calyptra, operculum, annulus, peristome, spores, and in the ramification, I am unable to find a shadow of difference between them. In this case the authorities upon *Cryphaea glomerata* appear to have been sufficiently consulted; not so the typical plant itself!

(12.) *Hypnum Watsoni*, L. & J. Hab. Colorado, *Watson.*—There is a more accurate description of this species in the Bryology of the 49th, paralell, by Mitten, under the name of *Hyp. plicatile.* (1864.) It is undoubtedly *Hyp. Heufleuri*, JURATZKA. (1861.) (compared with a specimen from Schimper kindly furnished by Mr. James.) It is also *H. revolutum*, LINDB., Ms. & *H. recurvo-marginatum*, n. sp? AUST. Ms. I have many specimens of it from Colorado, Oregon and Brit. Columbia. It also occurs in the high latitudes and alpine regions of Europe. The most striking feature

of the species is the (usually) broadly revolute margin of the leaf, from base to point. The capsule is curved in the middle from an erect base, the operculum is shortly conic and very obtuse. The leaves are often serrulate at the apex, shortly bicostate, and furnished with a larger or smaller, usually not well defined patch of very short and minute, more or less obscure cells at the basal angles. In mode of growth, ramification, and in the reticulation of the leaves it is variable. I have what appears to be a form of this species also from Monterey, Mexico.

(13.) *Hypnum Alaskanum*, L. & J. Hab. Alaska, *W. H. Dall.*—A fine species and deserving a more complete description than our authors have given it. They describe it by now comparing and now contrasting it with *Hypnum Schreberi*, WILLD, to which they in the main liken it. The form of the leaf, excepting that it is not involute-acuminulate at the apex, is much as in that species; but in size, facies, closely pinnate ramification, texture of the leaves, presence of paraphyllia on the stem, &c., it is totally distinct, being a true *Pleurozium*, as the following description from specimens communicated by Mr. James will show:

[**Hylocomnium (Pleurozium) Alaskanum.**—*Hypnum Alaskanum*, *L. & J.* in Proc. Amer. Acad., Boston, for 1879, p. 139.—Stems closely pinnately and bipinnately branched, and, as well as the branches, densely paraphyllate, about $\frac{1}{2}'$—$\frac{3}{4}'$ wide; branches widely spreading, (the ramuli very short and mostly divaricate), subdepressed, obtusish or acutish. Paraphyllia much divided, the divisions capillary. Stem-leaves large, broadly ovate, rotundate-obtuse, concave, smooth, of a firm texture, even, or here and there sulcate-striate, particularly near the lower margins, which are usually (either broadly or narrowly) revolute and often apparently solid, shortly and obscurely somewhat bi-pluricostate; the margins remotely serrate-denticulate; ordinary cells elongated, linear, subvermicular, remarkably obtuse at both ends, more or less discrete, opakish,—the interstices more or less confluent; the basal cells somewhat widened, but scarcely shorter, solid, dark fulvous, not well defined; both in the centre and at each margin, where they are the most conspicuous, these fulvous cells extend upwards for a longer or shorter distance, often forming costæ-like striæ. Branch-leaves much smaller and less denticulate, otherwise similar. Inflorescence and fruit not seen. Nearest to depauperate forms of *H. splendens*, (HEDW.) from which, however, it is readily distinguished by its more uniform less compound ramification, obtuse smooth more shortly bicostate more opake less serrulated leaves, with more obtuse and more discrete cells, &c.]

(14.) *Ephemerum spinulosum*, SCHIMP.—The remarks here made by Schimper, as well by L. & J. upon both this species and *Ephemerum crassinervium*, SCHWGR., although true enough upon the whole, throw no new light upon these two protean mosses. I have spent hour after hour vainly trying to arrange my specimens and to separate them into intelligible forms, and should hail with delight a dissertation upon them that would point me the way out of the difficulty.

(15.) *Systegium erythrostegium*, BRUCH & SCHIMPER, *Phascum*

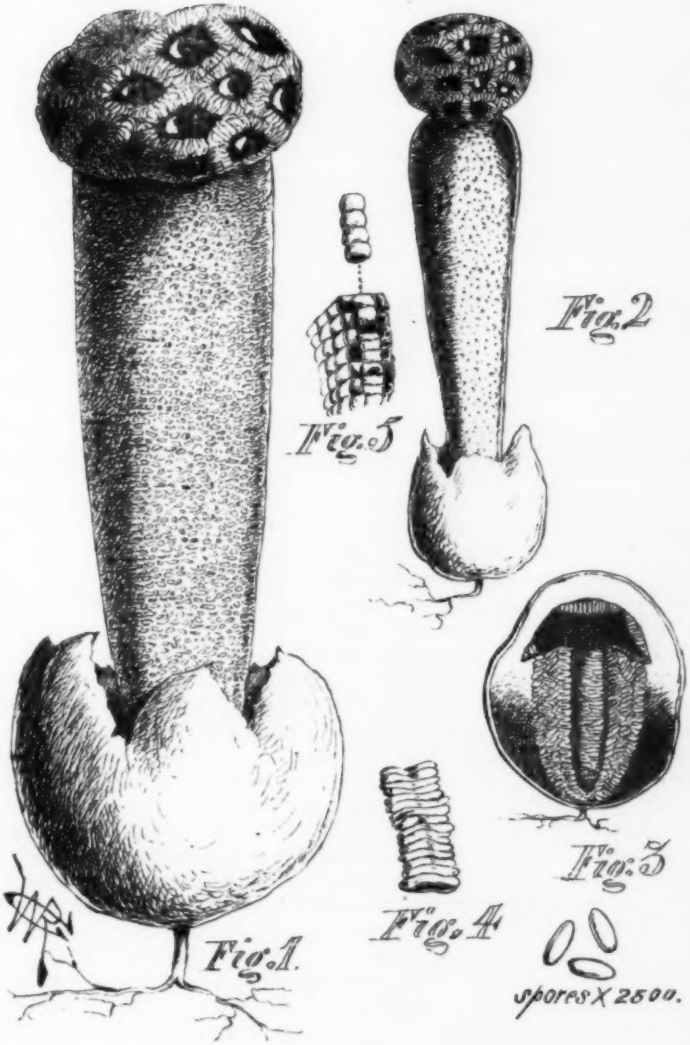
crispum, var. *rostellatum*, H. & W., in Drummond's Southern Mosses No. 10. Hab. New Orleans, Drummond.—I have not been able to see Drummond's No. 10, but I have a *Systegium* from the same region, collected by Hall, Mohr and Featherman, which appears to be not rare throughout the Gulf region, and the only species yet found there; for the diagnosis of Bruch and Schimper describes it with sufficient accuracy. It is *Astomum* (*Systegium*) *Ludovicianum*, SULLIV, Icones, T. 12. The male flower is terminal, becoming lateral, as B. & S. describe it; or probably in rare instances becoming dichotomal as shown in the Icones.

(16.) *Orthotrichum brachytrichium*, SCHIMP.; *O. obtusifolium*, Drummond's Mosses of Brit. Amer., n. 157. Hab. Canada East to the Rocky Mts.—There is some mystery here which I am unable to solve. Drummond's moss is identical with the European *O. obtusifolium*, SCHRAD., which is most accurately described in Schimper's Synopsis, Ed., 1860, p. 263. It is also identical with the numerous specimens which I have from the same region, collected chiefly by Fowler and Macoun. Schimper describes it as having "apiculate acutely carinate most minutely papillose leaves, with the margins subrevolute-reflexed, inflorescence monoecious, calyptra pale straw-colored, and with a few short hairs on its apex." I find the leaves to be obtuse, not carinate, mostly clothed with large papillae, inflorescence dioecious, calyptra with a pale base, fuscous brown above, epilose, and papillose-tuberculate. I have picked from among some *Orthot. Ohioense*, collected by myself in the Jordansville Swamps, N. Y., about a half-dozen sterile stems of this species. Some of these have the leaves all obtuse, more have them nearly all acute or acutish, and one or two of the stems have the upper leaves somewhat hyaline-apiculate; otherwise they are normal. I have not seen acute leaves on any other of my specimens. There is a depauperate form of this species, always sterile, found on shade trees, old stone fences and limestone rocks, as far south as New Jersey.

(17.) *Plagiothecium pseudo-Silesiacum*, SCHIMPER, *Hypnum Silesiacum*, H. & W., in Drummond's Southern Mosses No. 111. Hab. Near St. Louis.—I have not been able to get a fragment of No. 111, from this collection. But since nothing answering to Schimper's description, except *Plagioth. striatellum* (BRID.), and *Pl. turfaceum*, LINDB., appears to have been found in North America, at least since Drummond's time; there can be little if any doubt of its being one or the other of these widely distributed species. The basal cells of the leaf not being described, leaves some doubt as to which of the two it belongs; but since the description fits the former in some respects exactly, while it fits the latter only in a general way, and since the former is the more southern specie, it becomes quite apparent that the moss above referred to is only *Pl. striatellum*. (*Pl. Muhlenbeckii*, BR. EU.)

§ 3. **A New Fungus.**—By W. R. GERARD.

Simblum rubescens, *nov. sp.*—Volva subglobose, whitish, bursting irregularly into three or four lobes, which soon become very remote from the stipe. Receptacle depresso-globose, very slightly broader than the stipe, cancellate; branches crisped, flattened, and with sinu-



SIMBLUM RUBESCENS GERARD.

(Natural size.)

ated margins, forming, by their oblique anastomosing, areolations which are nearly always quite regularly pentagonal. Stipe hollow, elastic, cylindrical, tapering towards the base, abruptly rounded at the apex and strongly constricted at its junction with the capitulum. Hymenium olive-brown (ochreous yellow when dried in a thin stratum on paper.) Spores obtusely elliptical, .0001′ (.003 mm.) long. Plants from 3 to 5 inches high ; stipe six lines to one inch in diameter at the broadest part. Color deep fleshy red, bordering on vermilion in the capitulum, and paler towards the base of the stipe. The odor emitted by the sporiferous mass is a peculiar and indescribable one and can be best compared to that of *Corynites Ravenelii*—heavy and slightly nauseous, but not fetid. Shortly after the fungi are gathered, and especially while they are being dried, the smell, at a short distance, is not unlike that of benzoic acid.

Habitat. Among grasses in open places, in various parts of Astoria, Long Island.

My attention was called to this fungus by the Rev. Washington Rodman, who showed me last August, a colored drawing of it made by Miss Trask for her father, Dr. James B. Trask, its discoverer. Having subsequently received fresh specimens of the plant itself from both Mr. Rodman and Mr. Wm. B. Halsey, I recognized it as a species of *Simblum*—a remarkable addition to our American flora, inasmuch as the genus has hitherto been considered as exclusively a tropical one. Of the species which have been described, *Simblum periphragmoides* Klotzsch, the large, robust species, on which the genus was founded, occurs in the Mauritius Islands ; *S. gracile* Berk. (for a description of which I am indebted to Prof. W. G. Farlow) is found in Ceylon ; *S. flavescens* Kurtz, in Java ; and *S. pilidiatum* Ernst., and *S. sphaerocephalum* Schlecht., in South America. A comparison of the species under consideration with the original descriptions and figures as given by the authors of the foregoing, showed it to be quite distinct, not only as regards form but also as to color and other characteristics. Of the species just mentioned, the first and second are pale yellow ; the third sulphur yellow ; the fourth white ; and the fifth, although described by Schlechtendal as " more of a brick than of a flesh-red," is figured as a brownish yellow. Of these species, *Simblum rubescens* is most nearly related to *S. sphaerocephalum*, but differs in the form of the upper part of the stipe ; in the bright red color, which is deeper in the receptacle ; in the color of the hymenium ; in the odor emitted by the sporiferous mass, which does not, as Schlechtendal expresses it, " stink fürchterlich," but is merely slightly nauseous ; and in the shape of the volva, the lobes of which, after bursting, expand very widely and form a very shallow cup, to the centre of which is affixed the stipe by its exceedingly narrowed base. The plants are solitary and make their appearance after the rains of Summer and Autumn. The capitulum as it bursts from the volva, always carries up with it a small piece of the latter temporarily attached to its upper surface, as does *S. gracile*, according to Mr. Berkeley, in his description and figure of that species. A section of the stipe shows that it is composed of three layers of elongated chambers or cells, the thick lateral walls of which,

while the plant is still enclosed in the volva, (Pl. 1, Fig. 3), are several times plicated or folded and strongly compressed. In the mature plant, the evidence of these plications is still visible, causing the expanded chambers to appear as if composed of a string of roundish cells of nearly uniform size ; as seen in Fig. 5 of Plate 1, which represents an edge of the stipe in section, and shows the external aspect of the cells or cavities as seen in its interior. The external walls of this innermost layer of cells are smooth and continuous, and rarely perforated. Those of the extreme outer layer, in the very early stages of the plant, are entire and arranged horizontally like the cells in the hymenophore of *Cynophallus caninus ;* but, when the fungus is fully expanded, these become minutely lacerated and perforated so as to give the external surface of the stipe. when viewed under the lens, a spongy aspect. The apex of the stipe is somewhat abruptly rounded and perforate ; and from the margin of the aperture start the primary branches (6 to 8 in number) of the cancellate structure. These hollow branches or reticulations, septate at intervals, are an upward extension of the inner layer of cells ; they have precisely the same structure, and only differ in being more vertically compressed and laterally flattened (Pl. 1, Fig. 4.) Occasionally two contiguous rows of cells unite to form one of the reticulations, and in this case the latter is marked throughout its whole extent by a deep central depression. In the smaller specimens of *S. rubescens* the areolations formed by the reticulations are in most cases quite uniformly and regularly pentagonal, but in the larger plants there appears to be a little less regularity in this respect.

The outlines of Fig. 1, Plate 1, (which represents the full size apparently to which the plant attains) were copied from a water-color drawing executed by Miss Trask, all of the specimens which I have seen being much smaller. Fig. 2 shows one of these small specimens with the capitulum slightly elevated in order to exhibit the rounded apex of the stipe and its mode of juncture with the receptacle. Although the latter features are always strongly marked in the dried specimens, they would scarcely be noticed on a mere cursory inspection of the living fungus owing to the depression of the capitulum around the top of the stipe, which is due to its somewhat flabby consistency. Plate 2 shows a curious departure from the normal form, in which two stipes arise from the same volva and support one capitulum in common. This figure, which has been photo-engraved from a sketch not intended for publication, is incorrect in one particular, the vertical diameter of the receptacle being represented at least a third too great. The specimen was brought to me by Mr. Halsey. In studying this plant, I have been under great obligations to Messrs. Rodman, Trask, and Halsey for specimens, fresh and preserved, and for various items of information in regard to it.

As the literature relating to the American *Phalloidei* is somewhat scattered, it may not prove uninteresting to botanists if I bring together in this place all the genera and species of the order which have been detected in the United States up to the present time.

SIMBLUM RUBESCENS GERARD.

(Abnormal growth.)

LIST OF UNITED STATES
PHALLOIDEI.

Phallus L. (A. Hymenophallus *Nees.*)
indusiatus Vent., S. Car., Pa. (Schw.), Mass. (Frost). Conn. (Eaton.)
Daemonum Rumph, Ohio. (Lea), N. Y. (Peck).
duplicatus Bosc. S Car., Pa. (Schw.), N. Y. (Ger.), Mass. (Frost: Sprague), Conn. (Wright.)
Ravenelii B. & C., S. Car., (Rav.), N. Y. (Pk.)
(B. Ithyphallus *Fr.*)
impudicus L. S. Car., (Schw.), N. Y. (Pk. Ger.) Mass. (Farlow: Frost.), Ohio (Lea),
(C. Leiophallus *Fr.*)
rubicundus Bosc. S. Car.. N.Y. (Schw.), Mass. (Frost.)

Cynophallus Fr.
caninus Schaeff. S. Car.,(Curt.) Mass.(Frost.) N.Y.(Warne.)

Corynites B. & C.
Ravenelii B. & C. S. Car., (Curt.) N. Y. (Pk.: Howe: Ger.)
Curtisii Berk. Conn. (Wright.)
brevis B. & C. (Inserted in Curtis' Catalogue but not mentioned in Berkeley's Notices of N. A. Fungi.)

Simblum Klotzsch.
rubescens Ger. N. Y. (Trask; Rodman; Halsey.)

Clathrus Mich.
cancellatus L. Ga. (Leconte, *fide* Schw.)

Laternea, Turp.
columnata Bosc. S. Car. (Bosc.), Ga. (Leconte.)

§ 4. Flora of Richmond County, N. Y. Additions and new localities, 1879.

Podophyllum peltatum L. Sparingly near Rossville.
Nasturtium palustre DC. Near Port Richmond and Woodrow.
Draba Caroliniana Walt. Near Rossville.
Sisymbrium Thalianum Gaud. Near Woodrow.
Camelina sativa Crantz. Rossville village.
Linum usitatissimum L. Sparingly at Clove Lake.
Coronilla varia L. Roadsides near New Dorp and Giffords.
Desmodium laevigatum DC. Sparingly near Tottenville.
Trifolium incarnatum L. Sparingly in waste ground near Richmond.
Rubus strigosus Michx. Near Pleasant Plains.
Fragaria Indica L. In Richmond Village.
Ribes floridum L. Near Pleasant Plains.
Coriandrum sativum L. Sparingly along the Sea Beach, near New Dorp.
Cicuta pulpifera L. Linden Park Swamp.
Lonicera parviflora Lam. Near Prince's Bay, 1870, [W. H. Leggett.]
Sericocarpus solidagineus Nees. Tottenville.
Aster concolor L. Kreischerville.
Solidago patula Muhl, Clove Lake Swamp.

Solidago neglecta T. & G. Clove Lake Swamp.
Vaccinium Pennsylvanicum Lam. Rather abundant about Tottenville.
Vaccinium macrocarpon Ait. Sparingly near Clove Lake. Near Richmond.
Gaylussacia frondosa T. & G. On Goat Hill, near New Dorp, and at Tottenville. Frequent.
Monarda fistulosa L. On Richmond Hill, and near Willow Brook.
Lophanthus nepetoides Benth. New Dorp.
Phlox subulata L. Near Rossville. (G. W. Wright.)
Solanum rostratum Dunal. A single plant near Four Corners, 1875, (W. H. Rudkin.)
Artemisia vulgaris L. Port Richmond.
Atriplex patula L. var, **littoralis** Gray. West New Brighton.
Quercus Phellos L. Sparingly at Tottenville.
Sparganium eurycarpum Engl. Near Garretsons.
Vallisneria spiralis L. Clove Lake Swamp.
Calopogon pulchellus R. Br. Linden Park Swamp,
Habenaria ciliaris Lindl. Tottenville.
Habenaria tridentata Hook. Tottenville.
Tradescantia Virginica L. Escaped from gardens at Tottenville.
Cyperus cylindricus N. L. Britton. Tottenville.
Eriophorum Virginicum L. Near Richmond.
Rhynchospora alba Vahl. Clove Lake Swamp.
Cladium mariscoides Torr. Linden Park Swamp.
Carex subulata Michx. Swamps near the railroad. (W. H. Leggett.)
Carex monile Tuck. Near New Dorp.
Carex lanuginosa Michx. Near New Dory.
Carex sterilis Willd. Rather common.
Agrostis alba L. Common.
Calamagrostis Canadensis Beauv. Linden Park, and Clove Lake Swamps.
Calamagrostis Nuttalliana Steud. Watchogue and Tottenville.
Eatona iobtusata Gray. Linden Park Swamp.
Glyceria obtusa Trin. Tottenville.
Glyceria acutiflora Torr. Near Bull's Head.
Eragrostis poaeoides Beauv. var. **megastachya** Gray. Port Rich-
Uniola gracilis Michx. Tottenville.
Arrhenatherum avenaceum Beauv. Clifton and Richmond Village.
Andropogon macrourus Michx. Tottenville.

CORRECTION.

Cyperus retrofractus Torr. (?) should be **C. cylindricus** N. L. Britton. Sparingly at Tottenville.

C. A. Hollick,
N. L. Britton.

Terms—*One dollar per annum beginning with the January No. Address*, P. V. LeRoy, *Herbarium, Columbia College, 49th St. and Madison Ave., N. Y. Money orders on* **Station H**, *N. Y.*
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BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII.] New York, February, 1880. **[No. 2.**

§ 5. **Proceedings of the Torrey Club.**—The regular monthly meeting of the Club was held at the "Herbarium," Columbia College, Tuesday evening, Feb. 10. In the absence of the President and Vice-President, Mr. J. D. Hyatt was called to the Chair. There were 24 members and 4 visitors present.

The following errors in the minutes, which also crept into our preceding report, were corrected: *Stellaria media*, not *Cerastium arvense*, was found in flower Jan. 11th; and the double-bracted *Cornus* was exhibited by Mr. Schrenk, not by Mr. Britton, as stated.

Mr. LeRoy exhibited a specimen in flower of *Sarracenia flava*, L., the roots of which had been brought from the swamps of South Carolina.

Mr. Wright of Staten Island exhibited a black-flowered Iris, raised from a bulb direct from Egypt.

Mr. J. D. Hyatt exhibited a remarkable and beautiful woody gall, the leaf-like lobes of which were curiously carved and almost seemed executed by the hand of an artist. The specimen came from Mexico.

Mr. Hollick, in behalf of the Map Committee, presented a large geological map of the district embraced within the limits of the Torrey Catalogue, the joint work of himself and Mr. Britton.

The Case Committee reported that the new case for the herbarium of the club had been purchased, and was now ready for the inspection of members.

Mr. Samuel Henshaw was elected a member; and the names of two other persons were proposed for membership.

At the suggestion of Mr. Leggett, Mr. W. R. Gerard was elected assistant editor of the BULLETIN.

Dr. Jarvis read a paper on "Galls." The author, who has made a life-long study of these organisms, briefly reviewed the opinions that have been held in regard to their formation from the earliest times up to the present, and boldly took issue with Darwin, Huxley and others in regard to the statement that these excrescences were of insect origin. He asserted that these gentlemen had merely accepted the statements of others without personal investigation of the facts. Dr. Jarvis claimed, and it was the object of his paper to prove, that all galls are normal productions of the plants on which they grow; and that these productions, by a species of evolutions of the protoplasm contained within them, eventually gave birth to animal life. The life history of these beings, from the formation of the primordial utricle up to the period when they make their egress in a perfect state from the zoocarp (as the author styles the gall), was minutely described by means of large diagrams and numerous specimens of galls derived from various plants.

Owing to the lateness of the hour, the botanical paper of the evening, by Mr. Hollick, on the "Relation between Geological Formations and the Distribution of Plants," was merely read by title and handed to the Editor for publication in the BULLETIN.

§ 6. **Relations between Geological Formations and the Distribution of Plants.**—The notes, from which this paper was compiled were taken during the past season on Staten Island and are, therefore, very restricted and local in their nature; but even within such narrow limits, the effect which the geological formation seems to have on its accompanying flora is so marked, that it seems of vast importance, alike to the practical botanist in his collecting tours, and as a field of speculation for the theorist.

We have, on Staten Island, two well marked geological features —the *Drift*, which covers about two-thirds of the entire Island, nearly all the northern part and extending as far south as Princes Bay, and the *Cretaceous*, which occupies the remaining small area in the southern and western part. This latter is a continuation of the New Jersey clay beds.

The geological line of separation between the two formations is not always very distinct, but the limits of the different species of plants mark it in unmistakeable characters. The two floras are remarkably distinct. That one belonging to the Cretaceous is well represented by *Arctostaphylos Uva-ursi*, *Aster concolor*, *Pinus inops*, *Quercus Phellos*, *Quercus nigra*, *Lycopodium inundatum*, *var. Bigelovii*, and many more of the Pine Barren plants. Thus far I have never found one of these species to have crossed the line of the Drift, but in their stead will be found *Pinus rigida*, *Quercus alba*, *Quercus rubra*, etc., and the majority of those plants which grow in the vicinity of New York Island, and up the Hudson.

Those plants which belong to the Drift seem to adapt themselves more readily to the Cretaceous than "vice versa," for while we find *Quercus alba* and *Pinus rigida* growing in Cretaceous clays and sands, the *Quercus Phellos* and *Pinus inops* have never been seen out of their natural geological location. The same may also be said of the more northern species of *Aster*, which occur quite plentifully with *Aster concolor*, but this latter will not spread beyond the Cretaceous. It would be interesting to know if these facts hold good in other localities. It almost seems as if the Drift flora were gaining on the Cretaceous and gradually crowding it off the Island.

A curious and interesting case of restricted locality, due apparently to geological causes, is seen in *Clematis ochroleuca*, which only grows on the dry hills of magnesian rocks which form the main ridge of the Island and in the vicinity of the Limonite ore deposits.—It is accompanied by *Cerastium oblongifolium*, which likewise seems equally restricted. Do these same conditions prevail in other localities where these comparatively rare plants occur?—In an isolated hammock of soapstone and iron ore, fully three-fourths of a mile away from the ridge, and having no intermediate connections, *Clematis ochroleuca* was found. Probably by others, who have had a wider area for research, many more instances of a similar nature may have been

noted, as for example the well known restriction of *Camptosorus rhizophyllus* to the vicinity of limestone cliffs.

When the effects of the geological formation on the distribution of plants and the relations between them are better known, it will certainly facilitate the efforts of the collector by directing him to localities where the geological formation is similar to that of known districts, and where he may reasonably infer that the flora will be also in keeping; provided, of course, that there is not too great a diversity in climate and physiographic conditions.

Within a radius of perhaps 50 miles it would be reasonable to expect that similar geological conditions would afford similar floras.

Port Richmond, S. I. ARTHUR HOLLICK.

[As regards *Camptosorus* we may state that, according to our own observations, the plant is not exclusively calcicolous; it is not rare in the Hudson River Valley on the slates and shales of the Hudson River Group. And we may say the same of *Asplenium Ruta-muraria*; which also is usually described as one of the lime-rock ferns.—EDS.]

Setaria glauca, Beauv. and **S. viridis,** Beauv.—Last Summer I collected indiscriminately, and from many localities, specimens of *Setaria*. During this Winter I analyzed about 15 of them under the microscope and found only *one* specimen of the *S. viridis!*—Is the *S. glauca* so much the commoner of the two, or was this only accidental?

A. H.

§ 7. **Bryological Notes,** by C. F. AUSTIN.

Sphagnum macrophylum, BERNHARDI *Var.* **Floridanum,** AUST.—Differs from the typical form, as described and figured in Sulliv. Icon. p. 1. t. I., and as represented in various exsiccati, in its lurid green, or often albescent color; but chiefly in the areolae of the leaves being about twice as long and furnished with 40–70 *extremely minute pores, in two rows.*—A remarkable var. Hab. Florida.

Sphagnum cuspidatum, EHRT., *Var.* **serratum,** AUST.—*Sphagnum serratum,* AUST., this Journal, vol. vi., p. 245; also Musc. Appalach. Suppl n. 453.—Specimens collected by Capt. Smith about Lake Harris, Fla., last spring, show pretty conclusively that this is only a remarkable form of *Sph. cuspidatum;* only the leaves on the uppermost branches being decidedly serrate.

Bruchia Sullivanti, AUST., *Var.* **microtheca.**—Form and texture of the leaves normal; but the plants are much smaller than usual. The capsule is about half the usual size and of a fine light brown color, with a remarkably short collum usually passing insensibly into the pedicel, which is geniculate when moist and straight when dry. Sporangium round-oval, twice the length of the collum. Spores among the smallest of the genus, or about 1-1,000 of an inch in diameter, *not papillose but very minutely granulose.* Inflorescence for the most part antoicous, Hampden Co. Va. Apr., 1878. J. D. S.

DONNELLIA, nov. gen.

Donnellii Floridana, AUST., *Fabronia Donnellii,* AUST., *in Bot. Gazette,* vol. ii., p. 111.—"Folis oblongo-lanceolatis strictiusculis nonnunquam submarginatis obsolete serrulatis fere ecostatis, cellulis perangustis, basilaribus majoribus subquadratis inflatis; capsula ovali

subincurva vacua sub ore constricta, peristomii dentibus 16 majusculis siccis subhorizontaliter incurvis humidis erectis apice leniter recurvis, articulatiionibus dorso valde prominentibus; autoica; fl. masc. parvo juxta femineum posito.

Hab. On the branches of a Live Oak, Florida, Feb. 1877, *Capt. John Donnell Smith.*

Mode of growth and form of capsule much as in *Hypnum microcarpum*, C. M., but smaller in all its parts, with narrower and more narrowly reticulated leaves not recurved on the margin, the inflated cells at the basal angles more numerous, peristome single, &c.—Remarkable for the prominent articulations of the peristomal teeth.

RAUIA, nov. gen.

Rauia scita, AUST.—*Hypnum scitum*, BEAUV., Prod. p. 69; AUST. *Musc. Appalach. n.* 300; also this Journal, vol. v., p. 3.—*Thuidium Appalachiani*, AUST., Mss.

Modus vegetandi, folii formis et textura ut in *Thuidio*, sed capsula peristomiaque leskeoidea.

Thuidium Alleni, *n. sp.*—Caule erecto vel depresso fasciculatim innovando bipinnatim ramuloso dense paraphyllato; foliis siccis crispatis, humidis latissime ovatis concavis brevissime subacuminulatis obtusis vel acutis planis vel subsulcatis, margine minutissime papillato-crenulata pro more plana, costa valida fere ad apicem continua, basi auriculata subdecurrente, cellulis minutissimis plerumque distinctis rotundiusculis minute unipapillosis, basilaribus vix majoribus; ramulis inferioribus brevibus laxis flexuosis eparaphyllatis, foliis minutis valde concavis ovatis obtusis, costa tenuiore et paullo breviore; superioribus majoribus strictis paucissime brevissime paraphyllatis, foliis cum caulinis subconfoimibus; paraphylliis longis simplicibus vel parce divisis geniculatis; floribus et fructu ignotis.

Hab. In a peat swamp near New Haven, Conn., Jan. 1880, *Mr. John Allen.* Communicated by *Prof. O. F. Allen* of the Sheffield Scientific Sehool. Resembles *Thuidium minutulum* (HEDW.), but is much larger. At a casual glance it would be apt to be mistaken for *Elodium paludosum*, SULLIV. But that is never bipinnate, has leaves acutely acuminate with longish cells, which are often not papillose, &c. It gives me great pleasure to be able to dedicate so fine a species to the Allens, father and son. They have recently sent me ample specimens of some very rare mosses, all in the finest condition. Among these is *Trichodon nodulosum*, AUST.

§ 8. **Cheilanthes vestita,** Swartz.—Mr. Chas. N. Arnold has sent us from Poughkeepsie a number of specimens of *Cheilanthes vestita*, Willd., gathered near that city by Mr. Clarence Lown. A note from Mr. Lown states that this fern was first detected by him growing on the rocks in the vicinity of the river in April, 1877. Afterwards, in September of the same year, he found it again growing luxuriantly on the rocks at New Paltz Landing, just south of the ferry dock, and opposite Poughkeepsie. The only other known station in New York for this fern is Washington Heights, where it was detected some years ago by Mr. Denslow. As Mr. C. H. Peck remarks, Poughkeepsie will doubtless prove its northern limit in this State.

§ 9. **Trichomanes radicans,** Swz.—Mrs, F. J. Harlow has sent

me specimens of this fern which she collected at "Natural Bridge," four miles from Sewanee, Tenn. E. S. MILLER.

February 13th.

§ 10. **Leucanthemum vulgare,** var. **tubuliflorum.**—The variety *tubuliflorum*, Tenney, of *Leucanthemum vulgare*, which was detected at Poughkeepsie in 1867 by Miss Crockett of Vassar College, has made its appearance in great abundance every year at the same locality where it was first found, and from which it has never spread. The ray flowers in this pretty variety are tubular, unilateral in varying degrees, and 5-lobed like the disk flower. I have found in nearly every instance that they possess two (rarely four) abortive stamens, i. e., stamens destitute of pollen. Dr. Gray, in his Manual (ed. 1868, p. 686) says of this variety: "An abnormal state of the White Weed, with the rays transformed into large and palmately or bilabiately 5-lobed (rarely 3-4-lobed) tubular corollas." But have we an instance of what we may really call "transformation?" Should not the pistillate ray flowers of the ordinary form of *Leucanthemum* themselves be regarded as *transformed* marginal disk flowers, the unilateral development of which has adapted them to assist, as Mr. Darwin suggests, in the process of cross-fertilization by making the plants more conspicuous to insects. And would it not be more proper, then, to consider the tubular ray flowers of the variety not as cases of "transformation," but rather as instances of partial *reversion*, by the regaining of lost organs, to some ancient form of the plant in which all of the flowers were tubular and perfect? I have a specimen of *L. vulgare* in which all the flowers—those of the disk as well as those of the ray—are ligulate and pistillate; and also a garden specimen *Chrysanthemum carinatum* in which, through an arrest of development, a large number of the disk flowers have lost their stamens and their purple color, and have become partially ligulate. These two instances, which come under the head of what gardeners call "doubling," I should judge are examples of what might be properly styled "transformation." W. R. G.

§ 11. **Suffolk County Plants.**—I have the pleasure of adding the following plants to the flora of Suffolk Co., L. I.

Hypericum adpressum, Barton, a few plants at the "Slough" on the East Hampton and Sag Harbor turnpike. At the same station, *Habenaria ciliaris*, R., Br. I also found it at Springs. At this place I found a Habenaria of a beautiful straw color, intermediate as it were between H. ciliaris and H blephariglottis. I was unable to visit the locality last year, so I cannot tell whether it is constant or not. H. blephariglottis grew in the same locality. I found in Amigansette *Lilium Philadelphicum*, L., though only a few plants. I was told that it grew plentifully on Montauk Point, though I did not observe it that year (1878). Last year it was out of flower when I was there. Mr. C. L. Allen discovered it in the woods near Wading River (1879) while we were out riding. I think I have never reported finding *Utricularia clandestina*, Nutt., at Manorville. This makes eleven species of Utricularia found in Suffolk County. I found one plant of *Conium maculatum*, L., in the yard around Clinton Academy, East Hampton. *Urtica urens*, L., grows sparingly in East Hampton, and

on Gardiner's Island. *Amarantus viridis*, L., grows quite plentifully in the door yards of East Hampton. *Tripsacum dactyloides*, L., I have found very sparingly at Wading River. On the shore of Fort Pond Bay, Dr. T. F. Allen found *Glaucium luteum*, L., very abundant in 1878. I found, the same summer, on the Point, *Polygala sanguinea*, L., and *Limosella aquatica*, L., var. *tenuifolia*, Hoffman. Last summer I found *Rumex maritimus* on the eastern shore of Great Pond, Montauk Point. *Cystopteris fragilis*, Bernh., I found in a deep ravine facing the Sound, near Wading River; also in an old well, at Rocky Point, a few miles west of here. *Spiranthes graminea*, Lindl., var *Walteri*, Gray, East Hampton to Montauk, also at Wading River. *Spiranthes simplex*, Gray, grows plentifully in and around Wading River. *Potamogeton gramineus*, L., var *graminifolius*, at River Head. *Pycnanthenum lanceolatum*, Pursh., Rocky Point. *Vaccinium Oxycoccus*, L., Wading River. *Aster nemoralis*, Ait., between River Head and Canoe Place. *Desmodium Canadense*, DC., Greenport and Gardiner's Island. *Muhlenbergia sylvatica*, T. & G., River Head. *Sonchus asper*, Vill., Montauk Point and Gardiner's Island. *Calamintha Clinopodium*, Benth., *Atriplex patula*, L., var., *littoralis*, Gray, and *Phryma leptostachya*, L., on Gardiner's Island. I found *Blitum maritimum*, Nutt., at Springs.

Gardiner's Island is a very interesting locality for botanizing. The Island contains 3,000 acres, and is composed of a fine large farm, large grazing tracts, salt marshes, streams of water, and about 150 acres of woodland. I was very happy to accept the kind invitation of Mr. J. T. Gardiner to visit the Island. My time was so short that I had but little chance to botanize thoroughly. I hope to be able to visit the Island at another season, when I think I can find more plants new to our County.

Epigaea repens, L., fruited very freely this last summer and matured seed in abundance. I also found this fall a great many very small seedlings. E. S. MILLER.

§ 12. **Juncus maritimus,** Lam., a European Rush, was found on Coney Island some years ago by Mr. C. H. Peck. At the suggestion of Dr. Engelmann, I went, Aug. 2nd, to the locality on the Island indicated by Mr. Peck, to whom I had written for information, having in view the verification of the original discovery. I found the plant still growing where it was first collected, although in limited quantity. It is apparently indigenous, as there seems no evident manner in which it could have been introduced into such a situation.

It grows, as Mr. Peck writes: "Near the western end of the Island, just over the sand ridges, on the inner shore." I found it just at the junction of the salt meadows and the sand hills, about half way between the tower at "Cables," and Coney Island Point.

Dr. Engelmann writes that the plant is certainly *J. maritimus* Lam. and not *J. Roemerianus*, as was originally reported in the BULLETIN.

Carex extensa, Good, originally found on Coney Island by Dr. T. F. Allen, still exists, growing near the *Juncus*. N. L. B.

§ 13. **Presque Isle,** Pa.—*Utricularia resupinata*, Greene. which

is reported from Northern New York, was also found here on Presque Isle last summer. This Peninsula was explored several years ago by Dr. Garber and by Judge G. W. Clinton, and from these reports its peculiar and interesting flora, which represents plants from the seacoast as well as several western forms, has become known. This year the Botany Section of our young Naturalists' Society, undertook to follow up the discoveries of the two named botanists, and to add to their list new ones if possible. The above named little plant was the first new find.

To give an idea of the character of the Flora of Presque Isle, I mention the following plants that were collected by our Botany Section during last summer. Cakile Americana, Nutt.; Arenaria lateriflora, L.; Hibiscus Moscheutos, L.; Lupinus perennis, L.; Lathyrus maritimus, Big.; Phaseolus diversifolius, Pursh.; Potentilla paradoxa, Nutt.; P. anserina L.; Nesaea verticillata, H. B. K.; Xanthium strumarium, var. echinatum, Gray; Bidens Beckii, Torr.; artemisia Canadensis, Mx.; Lobelia Kalmii, L.; Arctostaphylos Uva-ursi, Spreng.; Pyrola rotundifolia, L.; P. elliptica, Nutt.; P. secunda, L.; Chimaphila umbellata Nutt.; Ch. maculata, Pursh; Ilex verticillata, Gray; Lysimachia thyrsiflora, L.; Utricularia vulgaris, L.; U. resupinata, Greene; U. cornuta, Mx.; Gerardia purpurea, L.; Castilleia coccinea, Spreng.; Physostegia Virginiana, Benth.; Scutellaria galericulata, L.; Lithospermum hirtum, Lehm.; Shepherdia Canadensis, Nutt.; Euphorbia polygonifolia, L.; Myrica cerifera, L.; Sparganium palustre, L.; Habenaria Hookeri, Torr.; Liparis Lœselii, Rich; Juncus Balticus, Dethard; Cyperus Schweintzii, Torr.; Carex Pseudo-Cyperus, L.; C. histricina, Willd.; Eleocharis quadrangulata, R. Br.; Scirpus Torreyi, Olney; Zizania aquatica, L.; Sporobolus cryptandrus, Gray; Calamagrostis Canadensis, Beauv.; Tricuspis purpurea, Gray; Bromus racemosus, L. Most of these plants have been reported before by the above named gentlemen.

Of the plants found in the streets of Erie may be mentioned, Conium maculatum, L.; Blitum Bonus-Henricus, Reich.; Euphorbia Helioscopia, L.; and E. platyphylla, L. Our Botany Section will continue their researches next summer, and hope to report new discoveries.

J. GUTTENBERG.

§ 14. **Utricularia resupinata,** Greene.—In the BULLETIN for October, 1879, are some remarks with regard to Utricularia resupinata, Greene. I collected that plant in August, 1875, at the same locality, mentioned in the BULLETIN—namely, muddy shore of Beaver Lake, No. 4, Lewis Co., N. Y. During the past season I collected quite a number of the same plant on the shore of Big Moose Lake, Herkimer Co., N. Y., and at Twitchell Lake, in the same county. I do not think it is uncommon through Northern New York.

FRANK TWEEDY.

Plainfield, N. J.

§ 15. **Aster concolor,** L., **in Rhode Island.**—I have to record the finding of *Aster concolor*, L., in Rhode Island. It was discovered by Miss Lydia Barstow, of this city, on what is known as the Old South Road, near the village of South Kingston, and again, in larger quanties,

in Tuckertown, near Worden's Pond. It adds one more to the peculiar southern forms which occur in this interesting district. The plant was given me, correctly named, for confirmation. Again, all credit to the ladies!

Pods of Crotalaria expand with a jerk, sending seeds across my table, and then coiling spirally. W. W. BAILY.

Providence, R. I.

§ 16. **Varying Behavior of Plants.**—In the BULLETIN for 1878, referring to *Linum perenne*, I remarked that the behaviour of plants varied in different parts of the world. An interesting instance of this may be noted in Eggers' "Flora of St. Croix and the Virgin Islands," just issued by the Department of the Interior. In that part of the world, the common Field-mustard, *Sinapis arvensis*, has followed the cultivator, and in February produces cleistogamous flowers only, followed by the regular flowers the rest of the year. The common Water-cress, also introduced there, has never been known to flower at all. As the Field-mustard has been extensively introduced into Western New York, it would be worth while for those who have the opportunity, to watch the behaviour of the early flowers there.

THOMAS MEEHAN.

§ 17. **Impatiens fulva, action of bees toward.**—During the summer of 1878 I frequently observed the bees at work on flowers of this species, without noticing a single instance of perforation of the corolla—described in the BULLETIN for Sept., 1877—until the latter part of August, although I carefully examined many flowers. Then, one day, as I was watching a busy swarm of humble and hive bees, my attention was attracted to one of the latter, which started to enter a flower, but stopped for some reason, and crept around on the outside of the corolla, where she hung, head down, for a second, and then went on to another flower, which she entered without any hesitation. Keeping my eye on her, I picked the first flower, and found a perforation on one side of the nectary about 8 mm. from its end. Constantly watching her, I picked several flowers which she had properly entered, and found none of them perforated, but after a time she came to another flower, at which she hesitated, and then treated it in precisely the same manner as the first. This was also found to be perforated. The question now arose whether she perforated these flowers, or whether some previous visitor had done this; so when she started to crawl back on a third flower, I frightened her away, and, picking the flower, found it already perforated. Watching other bees, I failed to see another act in this manner, and was unable to find other perforated corollas. From her actions, this bee evidently was accustomed to visiting flowers in the legitimate way, until, coming to a perforated corolla, she saw the perforation from the mouth, when she crept back on the outside and sucked the nectar from the cleft, probably being able to secure more in this way than in the other.

After this I was unable to study this species till about the middle of September, when I found every full opened flower out of 55 which were examined to be perforated, some of them in at least three places.

Not having anticipated this result, I failed to note the species sufficiently, during the season, but from this it seems that occasional observations during another season will be well rewarded.

Ithica, N. Y. WM. TRELEASE.

§ 18. **Draba verna,** L., and **Sisymbrium Thaliana,** Gaud., **biennial.**—I send you to-day rosettes of radical leaves [and flowers] of Draba verna, for a twofold purpose—to show that we too have an early season, and that, so far as my experience goes, Draba verna is certainly (always?) a biennial plant. The radical leaves are formed in the fall, and the stem and flowers are developed very early in the ensuing spring. Sisymbrium Thaliana has the same habit.

Quite an abundant locality near me has enabled me to watch both of them closely. H. C. BEARDSLEE.

Painesville, Ohio, *Feb.* 18.

§ 19. **Montrosity in Carya alba,** Nutt.—My attention was recently called to a peculiar montrosity in the nut of *Carya alba*, Nutt. Instead of the seed being divided into two main segments, as is normally the case, there were three principal divisions, separated from each other by thin partitions of the endocarp, which was itself somewhat triangular in cross section. Never having noticed such a sport before, I think the fact worth putting on record.

Errata.—In the list of Staten Island Plants in the Jan. No. please correct the following misprints: p. 11, l. 6 from bottom, read "Cicuta bulbifera;" p. 12, l. 6 from top, read "Todt Hill;" l. 28, read "New Dorp;" l. 34, read "Eatonia obtusata." N. L. B.

§ 20. **Journal of the Cincinnati Society of Natural History.**—The number of this periodical, for April of last year, begins a new volume. The article of interest to botanists in this issue is Mr. Joseph F. James' "Catalogue of the Flowering Plants, Ferns, and Fungi growing in the vicinity of Cincinnati." The list of fungi embraced herein is one that was published in Mr. Lea's Catalogue in 1849, a work long ago out of print. Taking into consideration the fact that the study of Mycology is rapidly growing in favor in various parts of the country, and that the literature of the subject is greatly scattered, and some of it scarcely obtainable, the Cincinnati Society would be doing a great favor to students of this department of botany, as well as advancing the cause of science, by supplementing the bare list of fungi just noticed, with a republication of the descriptions of new species as they were originally given by Mr. Berkeley in Lea's work. We trust the Society will some day act on this hint, since, owing to the rarity of the publication mentioned, these descriptions are entirely inaccessible to most students.

As for the other portions of the Catalogue, the author here records, from his own observations, and from the Catalogues of Lea and Clark, 869 species of flowering plants, 5 *Equiseta*, 24 *Filices*, and 1 *Chara*. The number of species of fungi embraced in Mr. Lea's list is 319.

§ 21. **Botanical News.**—In the January number of the *American Naturalist*, Dr. Fred. Brendel concludes his interesting "Historical Sketch of the Science of Botany in North America, which was begun in the December number." This part embraces the period from 1840 to

1858. The mass of information here brought together is very valaluable, and is not easily obtainable by the ordinary botanist, unless he be in possession of the facilities offered by a very extensive library.

The *Botanical Gazette* for January contains the following notes: "Catalpa speciosa," by Dr. Englemann; "Tennessee Plants," by Dr. Gray; "Littorella and Schizaea pusilla," by the same, in which it noted the discovery (as already reported in the BULLETIN) of these plants in Nova Scotia by our fellow-member, Miss Knight; "Notes on Fungi," by M. E. Banning; "Introduced Plants in Dallas Co., Texas," by J. Reverchon; and, "Dimorpho-dichogamy in Juglans and Carya," by Thos. Meehan.

In *Science Gossip* for January we find a "List of the Local Flowers of the British Islands"; "A Report of the *Science Gossip* Exchange Club, for 1879"; "Notes on some of the Smaller Fungi," by G. E. Massee; and, "How to Double Stain Vegetable Tissues," an article which will prove of interest to those engaged in the microscopic study of plant-structure.

In the January number of the *American Journal of Science and Arts*, Dr. Gray sums up the "Botanical Necrology for 1879." From this we learn that the number of well-known botanists who have passed away during last year is fourteen. The additional note in the February issue, just received, raises the number to sixteen.

Last year we referred in a brief note to some investigations that had been made by Prof. Church, of England, on "Vegetable Albinism," and in which he showed that albino leaves contain less lime, but more albuminoid nitrogen than green ones, thus indicating a capability for development without actual growth. We learn from the *Chemical News* that, in a more recent paper read before the London Chemical Society, Dec. 20, 1879, Prof. Church shows that these albino leaves do not perform leaf-functions—that they do not possess the power, even in sunshine, of decomposing the carbon dioxide of the air, but that they add largely to the amount of that gas therein, thus resembling the petals of flowers, and the action of green leaves during darkness. The author also investigated the comparative loss and gain of albino and green foliage when caused to grow under the same conditions.

A recent number of the *Berliner Monatsschrift* reports some interesting experiments by Prof. Hoffmann, of Giessen, on the influence produced on the sex of dioecious plants by thickly sowing their seeds, and from which he has arrived at the conclusion that sex does not reside in the seed but in the result of the conditions of germination. In spinach, for instance, he found that one hundred seeds crowded in a pot yielded two males to every female plant, but when seeds from the same sample were planted in the open ground, they gave an equal number of each sex. Similar results are said by Prof. Prantl, of Aschaffenberg, to obtain in the prothallia of ferns when crowded, and Prof. Pfeffer, of Tübigen, has observed that the same holds good with Equisetum, more antheridia than archegonia being produced.

The subject of chlorophyll has been attracting considerable attention lately, and the *Journal of Botany* notices the recently

published results of Pringsheim on the functions of this substance. The author's paper is published in the Monthly Report of the Royal Academy of Sciences of Berlin, for July, and we find it also in the *Botanische Zeitung* for December 12th, along with an article on the "Chlorophyll of Plants," by F. Hoppe-Seyler. Pringsheim considers that chlorophyll, so long as it exists in the cell, protects the protoplasm from the injurious effects of sunlight, and suggests that it may serve as a regulator of respiration, by reason of its strong absorption of light, especially of chemical rays. He has also detected in the ground substance of all chlorophyll grains, and of all amorphous chlorophyll, a new body very sensitive to light, and easily destoyed by it, and which he calls hypochlorin or hypochromyl. This substance he considers to be the true primary product of assimilation of green plants, from which are derived by oxidation, under the influence of light, the starchy and oily contents of chlorophyll grains. Accumulation and growth of the latter proceed in proportion with a decrease of the hypochlorin in it. In darkness the starch is less stable than hypochlorin, showing that the conversion of the latter into more highly organized bodies in the cell is favored by the increased respiration occuring in light. In the *Comptes Rendus* (p 862) of the Academic des Sciences, M. Gautier describes the preparation of chlorophyll in a crystalline form. The details of the process would be out of place here, and we need only say that the chlorophyll, which is usually accompanied by a yellow crystallizable substance, is obtained in the form of flattened needles. The author remarks that he believes chlorophyll to be closely allied to bilirubine, both in its chemical composition and its reactions. Like the latter, it can pass successively from green to yellow, red, or brown, by the substraction or addition of oxygen. This relation of chlorophyll to bilirubine, and consequently to the hematine derived from the blood is of considerable interest. A continuation of these researches may possibly lead to a discovery of the means by which the change from the green coloring matter of leaves to the bright colors of petals is effected in nature, and this would prove of incalculable value to the florist.

Harpers' Magazine for February, issued as usual on the 15th of the month preceding, contains an interesting and well illustrated article on the Botanic Garden of that pioneer of American botany, Jno. Bartram, a spot, which, "Among scientific men of all countries has been the Mecca of their pilgrimage when visiting our shores."

The Essex Institute have purchased all but ten of the entire edition of Mr. Geo. E. Davenport's monograph of Botrychium simplex, to be used in their foreign exchanges. The original subscribers to this paper may congratulate themselves, as the work will never be seen now "at a reduced price," the remaining copies being held at $1.50 each.

Flora of Connecticut.—Mr. James N. Bishop, Plainville, Conn., sends us a circular, advertising that he is preparing a "Flora of the State, which will include both Phenogamia and Cryptogamia. It will be published during the winter of 1880-81." He calls for authentic information from all quarters.

The flora of Connecticut is very interesting and varied. We suspect that, unless Mr. Bishop is already well advanced with his work, he has hardly allowed time enough for its completion. Some years since we found a number of interesting plants at Canaan, Litchfield Co.: we recall *Moneses uniflora*, Gray, and *Betula pumila*, L., and there are several lime loving ferns, especially *Asplenium ebenoides*, R. R. Scott, found, we see, by Mr. J. S. Adams.

The California Horticulturist, San Francisco, generally contains some matters of interest to the technical botanist. In the February number, for example, is a charming account of a trip to Lassen's Peak, by Mrs. R. M. Austin, distinguished for her researches into the flora of that State. We quote one sentence, redolent of a botanical paradise: "There are acres of Mr. J. G. Lemmon's new *Corydalis Caseana*, Gray, growing along the streams which flow into the valley from the west, filling the air with its delicate fragrance."

The American Monthly Microscopical Journal, Romyn Hitchcock, 53, Maiden Lane, N. Y., one dollar per annum, pp. 20, is in fact, a continuation of the Quarterly, whose supposed demise was so unexpected and so much regretted, but which proves to have been but a stage of metamorphosis. Among the articles of special interest to botanists are Dr. Wolle's notes on "Fresh-Water Algae."

The Alphabetical Index of all known Ferns—a reprint of the index to the second edition of Hooker and Baker's Synopsis—is printed separately by Robert Hardwicke, 192, Picadilly, W. London, 1874, and is convenient for exchanges and other purposes.

The Academy, Feb. 7, contains what seems to us an instructive notice of Huxley's "Crayfish," by H. N. Mosely, in which, however, we find the following statement: "A most interesting fact is that the genus Astacus is represented by several species in British Columbia, Oregon, and California, while on the other side of the Rocky Mountains all the crayfish belong to a different genus—Cambarus. Now, the genus Astacus occurs in Japan, though not in South-Eastern Asia, Persia, Hindostan, Arabia, Syria or Africa. The connexion between the faunas of Japan and the Pacific coast of North America thus established is most interestingly borne out in the close relations which botanists have recognized between the floras of these two regions." This must be *Botanical News*, at least to the compatriots of Dr. Asa Gray.

§ 22. **Publications received.**—1. Vick's Floral Guide, 1880. James Vick, Rochester.—2. Aculeate Hymenoptera of North-western Kansas.—3. Generic Arrangement of the Bees allied to Melissodes and Anthophora.—4. The American Bembecidae; Tribe Stizini. All three by W. H. Patton, and extracted from the Bulletin of the Geological and Geographical Survey under F. V. Hayden, Washington, Nov. 30, 1879.—5. Science Advocate, Vol. I, No. 1. Henry A. Green, Editor. Issued quarterly by the Natural Science Society of Ateo, N. J.—6. The Naturalist's Quarterly, Vol. I, No. 1, Jan., 1880, Naturalist's Bureau, Salem, Mass., [apparently to take the place in Salem, vacated by Cassino].—7. A condensed List of a few of the most desirable Microscopes of moderate cost. R. & J. Beck, London and Philadelphia.—8. Arnold Puetz's Catalogue of Rustic Work, Plants, etc., Jacksonville, Fla.—9. Luther Burbank's Price List of Trees, Plants, Seeds, etc., Santa Rosa, Cal.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII. New York, March, 1880. **No. 3.**

§ 23. **Proceedings of the Torrey Club.**—The regular monthly meeting of the Club was held at the "Herbarium," Columbia College, March 9, the President, Dr. J. S. Newberry, in the Chair. There were present 18 members and 2 visitors.

Mr. Britton exhibited several specimens of the fruit of the Chocolate tree (*Theobroma Cacao*), consisting of pods of about the form and size of a thick cucumber, each containing several rows of large beans or seeds, which after being dried, roasted, and ground constitute the cocoa of commerce.

Mr. Leggett exhibited a number of the seeds of the edible pine (*Pinus edulis*), commonly known as "pine nuts," one of the main articles of food of the Indians inhabiting the regions in which they grow. The seeds are about the size of small kidney beans, and have a rich oily kernel contained in a thin shell. In favorable seasons these are gathered by the Indians in large quantities and sold to the people of New Mexico, Arizona, and the border settlements of Mexico. Dr. Newberry made some interesting remarks on this and other species of pines which bear edible fruit, and spoke at some length on the subject of some of the more peculiar conifers observed by him during his explorations in the West.

Mr. Le Roy called the attention of the members to a specimen of *Aspidium acrostichoides* in which the frond was very deeply bifurcated.

Dr. Newberry exhibited a Japanese botanical work, which, judging from the very beautifully executed plates, was devoted entirely to the order Compositæ.

Miss E. G. Knight read a short list of plants which she had observed in flower this season. According to her observations, made in Central Park, *Acer rubrum* and *A. dasycarpum* were in full flower on Feb. 14th; two willows (species ?) and *Corylus Americana*, Feb. 27th; *Symplocarpus foetidus*, March 1st; *Populus grandidentata*, March 5th; *Ulmus Americana*, *Cydonia Japonica*, and *Forsythia viridissima*, March 6th.

Mr. Bicknell, from observations made at Riverdale on the Hudson, made the following additions to the above list: *Alnus incana* and *A. serrulata* in flower Feb. 29th; *Draba verna*, March 1st; and *Taraxacum Dens-leonis*, March 4th. Mr. Bicknell also stated that the *Symplocarpus* was observed by him in flower at Riverdale on the 29th of February, and was then being visited by large numbers of bees. According to records kept by members of the Club as to the flowering of the foregoing plants in past years, the present season is just 35 days in advance of any that have preceeded it.

Miss Jane T. Meigs, and Mr. B. B. Chamberlin, both of New York City, were elected active members. One new name was proposed for membership.

Mr. Braman read a communication from Mr. Frank Tweedy, con-

sisting of some valuable and interesting "Notes on the Flora of Plainfield, N. J." After a discussion of this paper, Mr. Britton read a communication from Mr. H. H. Rusby, entitled "Notes on a Botanical Trip Through Northern New Jersey." Like the former, this paper contained very many valuable items of interest in regard to new stations for rare plants, and gave rise to considerable discussion. An abstract of both papers will be found in this issue of the BULLETIN.

§ 24. **Notes on the Flora of Plainfield, N. J.**—About a mile west of Plainfield, N. J., is a long and generally abrupt range of hills, trending to the northeast, and varying from 300 to 600 feet in height. This elevation, composed mainly of trap rock, forms a part of the triassic formation, and is known as "First Mountain" in the geological reports of the State. At Plainfield a deep gap occurs, through which flows Stony Brook, and on the slopes of this depression and in its immediate vicinity a number of interesting plants are to be found. On the northeast side of this gap, near the top, grows *Cheilanthes vestita*, Swartz., on a small ledge of trap rock, the plants covering an area of several square yards. I have collected specimens here that had some of the fronds branched near the apex. Here also with Cheilanthes grows *Opuntia vulgaris*, Mill., [?] the only locality for it that I have yet discovered near Plainfield. At the base of the ledge occurs *Phlox pilosa*, L., and about half way down the descent towards Stony Brook, *Zizia integerrima*, DC., is quite abundant. Along the stream *Clematis verticillaris*, DC, grows sparingly. This species I have found in large quantities, some 3 miles north of Plainfield on the same range of hills, growing with *Sambucus pubens*, Mich., on the western slope, rooting in rich black mould among masses of trap boulders.

Crossing Stony Brook and ascending a few rods, *Camptosorus rhizophyllus*, Link., can be found growing abundantly on low outcropping ledges of trap rock in the shade of a hemlock grove. It would seem, as Mr. Davenport remarks, that this fern is not by any means entirely confined to limestone formations. Fronds with auricled bases and irregularly sinuate margins are not uncommon at this locality, but the most singular abnormal form that I have collected is one in which the midrib of the frond forks just above the base, and, widely diverging, forms a twin or double frond, each bearing fruit dots and rooting from the two apices. With Camptosorus grow in profusion *Polypodium vulgare*, L., *Aspidium marginale*, Swartz, and *Asplenium Trichomanes*, L. At the base of the rocks and in the crevices between them the soil is kept constantly wet by the drainage from the higher land above, and here can be found several plants common to swamps and low ground, including *Trillium erectum*, L., and *Allium tricoccum*, Ait.

Passing up the ascent a short distance, *Viola rostrata*, Pursh., can be found growing abundantly in rich thickets, through which are scattered *Morus rubra*, L., *Ulmus fulva*, Michx., and *Corylus rostrata*, Ait. At this locality in July, 1875, I found *Aralia quinquefolia*, Gray. I have detected sparingly here also *Chamælirium luteum*, Willd., and *Melanthium Virginicum*, L. Further up the slope, in

rather open woods, can be found *Cynoglossum Virginicum*, L., and near by, *Asclepias quadrifolia*, Jacq., and *Gnaphalium purpureum*, L. During the past season I found a second locality here for *Cheilanthes vestita*, Swartz, but it was not growing in any quantity. Quite a large patch of *Arabis lævigata*, DC., occurs on the eastern slope of the mountain, a mile north, and, near the summit, *Arabis Canadensis*, L. *Viola cucullata*, Ait., var. *palmata*, abounds on the summit and slopes near the gap, and it seems here to almost entirely replace the typical form. The leaves are very deeply parted, often nearly divided, and the whole plant is pubescent. The var *cordata* is not rare on dry open hillsides, has very short petioles, the leaves generally villous, purplish beneath, and lying flat upon the ground. *Viola sagittata*, Ait., is very common but varies greatly according to the soil. The form found in moist meadows has long petioles, arrow shaped or oblong-lanceolate smooth leaves, purplish beneath, and more or less cut-toothed at the base. In dry open woods the leaves are ovate-lanceolate and abruptly decurrent on the short petiole, the whole plant pubescent; this last form approaching the *Viola ovata* of Nuttall.

At the foot of the mountain, near Somerset street, in a small stream, *Orontium aquaticum*, L., occurs sparingly. Further down on Stony Brook *Echium vulgare*, L., is abundant. Here in June, 1876, I found a Thaspium with purple flowers which in some respects resembled *Thaspium barbinode*, Nutt., but Prof. Gray identified it as *Thaspium trifoliatum*, var. *atropurpureum*, T. & G.

On the bank of Green Brook, a mile southwest of Plainfield, occurs a large staminate tree of *Negundo aceroides*, Moench. It is about 30 feet in length and nearly two feet in diameter at the base. Two miles south of Plainfield in a shallow pond in sandy soil grows *Utricularia inflata*, Walt., abundantly with *Glyceria pallida*, Trin., and *Proserpinaca palustris*, L. During Dec., 1878, in a swamp near New Brooklyn, I found a *Lemna* growing in abundance which appears to be *Lemna Valdiviana*, Phillipi, and near it can be found *Heteranthera reniformis*, Ruiz. & Pav. In woods near Park Ave., two miles south of Plainfield, occurs *Asarum Canadense*, L., and *Conopholis Americana*, Wallroth, the latter sparingly; and near by can be found *Lonicera parviflora*, Lam., and *Lonicera sempervirens*, Ait. In Cedar Brook, near Park Ave., *Potamogeton crispus*, L., and *Ranunculus aquatilis*, L., var. *trichophyllus*, Chaix., are very abundant—the former so much so as to choke up the stream. With these grow *Nasturtium officinale*, R. Br., *Veronica Americana*, Schweinitz, and *Myosotis palustris*, Withering, var. *laxa*, Gray.

Sisymbrium Thaliana, Gaud., occurs sparingly in a field near Evona. *Stellaria longifolia*, Muhl., is common in swamps and meadows. *Symphytum officinale*, L., and *Muscari botryoides*, Mill., can be found rather common in meadows around dwellings. *Woodwardia angustifolia*, Smith, grows in a swamp on Short Hills, and *Phalaris Canariensis*, L., sparingly along roadsides. *Bromus sterilis*, L., is abundant in Plainfield, on Grove street. *Cynthia Virginica*, Don, is common in dry meadows along Cedar Brook. *Gentiana Saponaria*, L., and *Gentiana crinita*, Froel., are common, the latter especially so on the wet open summit and slopes of the mountain. *Pentstemon*

pubescens, Solander, abounds in dry fields, and *Magnolia glauca*, L., in a swamp a mile south of Plainfield.

PLAINFIELD, N. J. FRANK TWEEDY.

§ 25. **Notes on a Botanical Trip Through North-western New Jersey.**—If the first year's work of the North Jersey Botanical Club resulted in nothing better, it infused a certain amount of enthusiasm for collecting, into the hearts of many persons to whom the feeling was before unknown. The result of this was the organization of a number of prolonged excursions. One of these, undertaken by two of the prominent members of the above club, and the writer, left Montclair on the afternoon of Aug. 13th, 1879.

The start being made, our road lay through Verona and Pine Brook to Parsippany, where the first event was the discovery of *Glyceria Canadensis*, Trin. A little farther on was found *Ranunculus alismaefolius*, Geyer, in abundance. Passing through Drakesville and Shippenport, the only interesting plants found were *Melanthium Virginicum*, L., *Habenaria psycodes*, Gray, and *Potentilla fruticosa*, L. Those not familiar with the latter plant can form no idea of the appropriateness of its specific name. In the northern counties of New Jersey it frequently covers the low grounds with such a dense and *hard* growth, as to render the passage across a field of a few acres of it very wearisome. The magnificent growths of *Epilobium angustifolium*, L., were also remarkable.

At Lake Hopatcong several days were passed. Here we saw *Polygonum amphibium*, L., var. *terrestre*, Willd., *Gratiola aurea*, Muhl., in abundance, and *Scutellaria galericulata*, L. We also collected fine specimens of *Sium lineare*, Michx., and *Brasenia peltata*, Pursh. *Corylus rostrata*, Ait., was abundant in the vicinity. But the most interesting plant found here, and which I think has not been noted heretofore, was a species of *Sagittaria*, probably *S. graminea*, Michx., with flowers varying from white to quite a dark purple, the petals having very firm texture.

At Blairstown we collected two or three specimens each of *Corallorrhiza innata*, R. Br., and *C. multiflora*, Nutt.

Crossing the Delaware river at Colombia, we went directly to the Water Gap. On the mountain sides we found *Cornus circinata*, L'Her., in fruit, in which state were also *Rhododendron maximum*, L., and *Hydrangea arborescens*, L. On the banks of Broadhead's creek, just above the Gap House, we found both species of *Apocynum*, *Elymus Canadensis*, L., var. *glaucescens*, Gray, and a species of *Avena* which we thought was *A. Smithii*, T. C. Porter. As the only specimen of the latter was lost, it must be left for some future collector to determine. The only other plants worthy of note were *Cenchrus tribuloides*, L., and *Verbascum Lychnitis*, L.

We next proceeded through Blairstown to Hardroicke. It was between the latter place and Stillwater that we first found those beautiful and delicate ferns, *Pellæa atropurpurea*, Link., and *Asplenium Ruta-muraria*, L., which afterward became so common on the cliffs, the graceful little *Asplenium* almost invariably filling the crevices, and edging the ledges on which grew its taller and more stately neighbor.

At Middleville we struck Swartzwood Lake and felt that we were fairly in for a few days solid enjoyment. Nor were we disappointed, as it is one of the most delightful spots for the botanist. The great profusion of *Nymphæa*, *Nuphar* and *Brasenia*, in their deep setting of *Nesæa*, is probably the chief feature of the locality. We secured a boat and in eager haste put off for "Nelumbium Inlet," at the northern end of the lake. While still half a mile distant, one of the party pointed out a long elevated line of green as being the *Nelumbium luteum*, Willd., the ultimatum of our journey; but the others were doubtful, on the ground that the leaves of the plant should rest upon the water. At last we discovered the individual leaves, then the petioles and finally a flower, and speculation was at an end. We saw before us in all its splendor this queen of the northern aquatics. Elevated from one to three feet from the surface of the water was this miniature yet majestic forest of leaves. Some that we measured were over two feet in diameter and almost perfectly circular, and it was only by careful selection that we succeeded in getting leaves small enough for herbarium specimens. A curious feature that attracted our attention was a narrow oblong figure stretched entirely across, and through the centre of many of the leaves. We finally discovered the cause. The leaf, before expanding, presents the appearance of two rolls, one on either side of the petiole, thus leaving a portion of the centre exposed to different conditions from the rest of the leaf. It is well for collectors to make a careful selection of a boat, and to go in force, for it is nearly impossible for one or two persons to penetrate beyond the extreme margin of the growth.

On the eastern shore of the lake we first found *Camptosorus rhizophyllus*, Link., and *Taxus baccata*, L., var. *Canadensis*, Gray. We learned from a farmer that *Phalaris arundinacea*, L., was much esteemed for fodder in this region; if cut early, two good crops being annually obtained. Before leaving this place we collected *Schollera graminea*, Willd.

Several fine specimens of *Asplenium ebenoides*, R. R. Scott, were found at Newton, which was perhaps the most interesting incident of the trip; it grew in company with *A. ebeneum*, Ait., and *Camptosorus*, and its appearance certainly favors Berkeley's opinion that it is a hybrid between these species.

At Ogdensburg we found *Mimulus alatus*, Ait. Returning home by way of Stockholm, Pompton and Little Falls, the only note-worthy discoveries were those of *Gerardia pedicularia*, L., and *G. quercifolia*, Pursh., and of *Lobelia Kalmii*, L., which were found near Stockholm.

HENRY H. RUSBY.

VERONA, N. J., Feb. 1880.

§ 26. **Additions to the U. S. Phalloidei.**—I have been informed by Mr. C. H. Peck, since the issue of the January number of the BULLETIN, that New York State should have been given as a habitat for *Clathrus cancellatus*, L., the plant having been detected near Buffalo, by Judge G. W. Clinton. This is a very interesting discovery since it authenticates the reported occurrence of the fungus in this country. Schweinitz (on whose authority it was inserted in my list) had not

himself found the plant, but published it in his Synopsis on the faith of a drawing sent him by Leconte. Mr. J. B. Ellis writes me, too, that from Texas he has received *Laternea triscapa*, Turp., and a species of *Lysurus* which he deems new, and calls provisionally *L. Texensis*. *Laternea triscapa*, I believe, has hitherto been found in the Western Hemisphere, only in Chili and St. Domingo. On the other side of the globe it occurs in the East Indies. Diligent search on the part of collectors may reveal in Texas the presence of *Clethria crispa*, Turp., which is known to inhabit Mexico. In the "Medical Repository" for 1808, in which Rafinesque gave a proem to his contemplated revolutionizing of the American flora, he characterized, under the name of *Colonnaria*, a genus of the fungi, which was apparently the same as what is now known as *Laternea*. He describes it thus: "Divided into four pillars united at the top, which bear seeds in the margin." What he had in view was evidently what is now called *Laternea columnata*, Bosc.; unable, however, to restrain his natural propensities he made several species out of it, such as *urceolata*, *truncata*, etc. If my surmises are correct in regard to the identity of this Rafinesquian genus with Bosc's plant, the latter then has a range as far north as Philadelphia at least. Another genus of the *Phalloidei* proposed by Rafinesque was *Ædycia*, which evidently was what Berkeley and Curtis have since distinguished as *Corynites*, which, by the way, does not seem to possess very strong claims to be regarded as different from *Cynophallus*, or *Mutinus*. The genus is thus characterized by Rafinesque:—"Tubular, perforated at the top, gelatinous composed of utriculs (*sic*) containing the seeds." The species *rubra* was "cylindrical, reddish, the top covered with a brown mucilage." Our author had also observed (or rather he *said* he had) a species which was entirely white, and which he names *alba-fusiform*. "Both species," he remarks, "have a most intolerable stinking smell." By Mr. H. W. Ravenel I am informed that the *Corynites brevis* inserted in my list is merely the first Ms. name for *C. Ravenelii*, and was probably printed thus in Dr. Curtis's catalogue by an oversight of the author.

Before leaving this subject I must allude to an interesting matter connected with these plants, and one which, although it may have attracted the notice of others, I have never met with in print. I refer to the curious

§ 27. **Correlation Between the Odor of the Phalloids and their Relative Frequency**.—I do not wish to occupy space in the BULLETIN with matter, which without explanation, would prove intelligible to but few, and may therefore be excused for entering upon some preliminary remarks in regard to the structure of these fungi, and which, although they may appear trite to the mycologist, will serve to make the subject of more interest to the general reader. One of the six families into which Fries divides the fungi is that of the *Gasteromycetes*. The characteristic of this family is, that the plants which compose it have their hymenium or spore-bearing portion enclosed in a volva or wrapper, making them truly angiocarpous. One of the orders of this family (the *Trichogastres*) contains genera whose species are commonly known as "puff-balls"—objects which are so familiar to

everybody that they need no very extended description. If a common puff-ball (*Lycoperdon*) be broken open at an early stage of its growth, the internal fleshy substance will be found to be firm and of a creamy whiteness. An examination of a very thin section of this whitish substance under a high power of the microscope will show that it is composed of closely compacted anastomosing threads, with here and there an irregular sinuous cavity lined with closely crowded club-shaped bodies (basidia) each tipped with from four to six spicules, and each spicule bearing at its apex a globular spore. When the spores are fully matured they become brownish and free, the hymenium is resolved into dry threads, and both together form a pulverulent mass. Next, the peridium bursts at the apex; and it then requires but the least touch from some passing animal, or even a slight pressure of the wind on the thin peridium to set free, in a single "puff," millions of the microscopic spores, which are thus disseminated far and wide. All this is very simple. Another order of the family is that of the *Phalloidei*, which, from the form and odor of a well-known species, is sometimes designated, with more truth than elegance, the "stink-horn" tribe. Here we have a structure analogous to that found in some of the puff-balls, but with a few important variations. In these fungi the volva or peridium is composed of three coats: an outer, thick white membrane; an inner, thin white membrane, and, between the two, a thick gelatinous layer. The hymenium or spore-bearing surface, enclosed within the inner membrane, is similar in structure to that of the puff-balls, and consists of a dense mass of threads presenting sinuous cavities lined with spore-bearing basidia. In these plants, however, the hymenium, instead of drying up into a dusty mixture of spores and threads, becomes moist, and then deliquescent; and, at maturity, drips away in a thick tenacious mucilage. It is evident, therefore, that were no method provided for their dispersion, the spores would simply flow down into the lower cavity of the volva, and there dry up into a hard mass; and that the plant would not only become local, but, in the struggle for existence constantly taking place in the organic world, would run the risk of extermination. Nature, however, has made a provision against such a calamity. On examining a section of the volva of one of the phalloids, we find that, according to the genus, the hymenial substance either surrounds the upper and external portion of a stem; or is enclosed in a network at the top of a stem (January BULLETIN, Pl. 1, Fig. 3); or is enclosed within stellate rays at the apex of a stem. In all cases, this stem is composed of large pits or cells, which, while the plant is still enclosed in the volva are very strongly compressed (See same Figure); but as the plant goes on maturing these cells acquire a rounder or more elongated form (Fig. 5, same plate), till at length their upward tendency is so strong that the volva is ruptured (sometimes with a loud report) and the hymenium is lifted to a height of several inches in the air. In the fungi of this order which have no stems (as in *Clathrus*) the network of the receptacle has the same cellular structure, and has precisely the same effect in bursting the volva and lifting the sporiferous mass into the air. One step is thus taken towards spore dispersion, but this is not enough,

and the plant must needs have some extraneous aid; and furthermore, any such aid must come quickly, inasmuch as these fungi by reason of their loose cellular structure are quite short lived. Now one of the most prominent characteristics of nearly every species of this order is that the sporiferous substance has a most abominable, fetid odor—one that can only be compared with that emitted by putrescent animal matter. In fact, so similar to decaying animal organisms is it, that even flies are deceived thereby; and before the ill-scented mass has had time to drip away it will have been greedily devoured by numbers of these insects. As flies have "no local habitation" they give the minute ingested spores a wide dissemination by means of their ejections. It is a well-observed fact that the very common species of "stink-horns" (*Phallus impudicus*, *indusiatus*, etc.) are found in the greatest abundance around human habitations, where they occur under porches, in the door-yard, and in the garden, and often in such numbers, and so frequently as to occasion serious inconvenience. This tendency to become domesticated is thus correlated with their fetid odor and the presence of those constant companions of man—the flies. More rarely, these malodorous plants are found in woods in the vicinity of villages and cities. In such localities, where flies are less abundant, the same office is often performed for them by other insects—especially by beetles. The only fresh specimen of a *Phallus* that I ever met with in the woods was being visited by several individuals of a common species of carrion-beetle—*Silpha Noveboracensis*. A writer in the *Science Gossip* for Nov., 1879, mentions a case observed by him where a stink-horn "had its cap almost denuded of the dark slimy mucus which covers it by swarms of ants, which were busily engaged upon what appeared to be to them a dainty feast." There is thus evidently something in the composition of this sporiferous substance which proves grateful to the taste of such flesh-eating insects as are attracted to it by its cadaverous odor. Braconnot, as the result of an analysis of this fetid slime, states that it is composed of "highly animalized fungin, albumen, mucus, superacetate of potash, and of a peculiar acid in combination with potash." It follows from what has been said that those species of these plants which possess the most putrid odor ought to be the commonest and most widely distributed ones. This, as far as observation can be made on the comparatively few species that occur in the temperate zones, is what we find to be the case. Those species, on the other hand, that do not possess a powerful odor tend to become rare. Thus, for instance, *Cynophallus caninus* is nearly odorless. It has a wide range, being found both in Europe and America, but it is recorded in all the books as being extremely rare and local. In the 10th volume of the British Entomology, Curtis figured a peculiar species of *Phallus* which he states was exhaling a faint odor of violets. On this figure Mr. Berkeley has founded a species and called it *P. iosmos*. This plant, although it has been carefully searched for, has never been found a second time. Has it become extinct from not offering an odor attractive to carrion-eating insects? Throwing out such species as have been founded on indifferent figures, and not on the plants themselves, the number of good species of this order which have been

described is probably less than seventy. Of these, two-thirds, as far as known, do not occur outside the tropics, and most of them have been described from one or two specimens collected by exploring expeditions, or individual explorers. It is thus impossible to obtain facts relative to their distribution. In the majority of cases, however, where any allusion is made to their odor, they are stated to be extremely fetid, and it is usually recorded of such species, too, that flies were observed eating their ill-smelling hymenium. In the cases of one or two Javanese species we are told that they were found growing on bamboo in the vicinity of the cottages of the natives. In some of these tropical genera the forms are extremely elegant; and especially is this the case in the genus *Aserοë*, the receptacle of which is divided into beautifully stellate, brilliantly colored rays. In most of the species of this genus the loathsome sporiferous substance is comparatively small in quantity, and in order to ensure of this being dispersed by insect agency, it would seem that this lack of quantity were compensated for by the bright conspicuous colors and the attractive forms that the plants assume. I was once asked by a friend who brought me the unexpanded volva of a *Phallus* as the supposed cause of an intolerable stench which proceeded from beneath a porch in front of his house, and which had caused his family great annoyance: "What good are these things; and, having such a vile odor, why do they remind us of it by so persistently thrusting themselves beneath our very noses?" The first question, in the present state of our knowledge, would be difficult to answer. So far as we know, these plants are of no practical use to man—being fit neither for food nor medicine; and, from an æsthetical standpoint, the species of the temperate zones, at least, have little to recommend them to the sense of sight, as most certainly they have nothing to commend them to that of smell.

The second question, I think has been sufficiently answered; although, in connection therewith, I may repeat what has often been remarked before, that the fragrant odors or the vile smells possessed by plants have been assumed by the latter with no reference whatever to man's delectation or annoyance, but, on the contrary, that they may prove advantageous to the plants themselves. It was probably with a feeling (shared by so many) that all things have been created for man's benefit alone, that led Bernardin de Saint-Pierre to write: "Plants which exhale delicious perfumes are of low stature in order that man may respire them." But Saint-Pierre, in his conceit, overlooked the magnolias, the honey-locusts, and a host of other trees which bear their fragrant blossoms way up out of man's reach.

W. R. G.

§ 28. **The North-Jersey Botanical Club.**—The regular monthly meeting of the North-Jersey Botanical Club, was held on Saturday, March 13th, in the High School building at Montclair. Twenty-four new members were elected. The following officers were chosen for the ensuing year: President, Henry H. Rusby; Vice-President, Miss H. Adelaide Shibley; Secretary, Walter M. Wolfe; Treasurer, George O. F. Taylor; Curator, Charles M. Davis; Executive Committee, the President and Secretary *ex-officio*, Chas. M. Davis, Randall Spaulding and Miss Nellie F. Bradford.

After the transaction of the regular business, at which it was resolved to purchase for the library Gray's Synoptical Flora of North America, and a set of the Pacific Railroad Reports, the Club went into session as a class and discussed the subject of "Leaves." A large part of the members being beginners in the study, these classes have been organized for their accommodation. The classes meet weekly, one in Montclair, one in Bloomfield, and the third in Orange.

Montclair, N. J. WALTER M. WOLFE, *Sec'ty.*

§ 29. **Botanical News.**—In a note published in the *Cronica Cientifica* (Barcelona) of Jan. 10th, a writer, Sr. Bofill, calls attention to a recently issued work by Sr. D. Estanislas Vayreda on the "Noteworthy Plants of Catalonia," in which the author asserts that the viscid secretion which invests the internodes of the stem of *Silene crassicaulis*, Willk. and Costa, (as also, to a less degree, those of *S. inaperta*, L., *S. nutans*, L., and a few other species) has the property not only of capturing such insects as come in contact with it (whence the English name "Catchfly"), but also of dissolving the soft portions of their bodies; and that these plants might therefore be considered truly insectivorous. Has it ever been noticed that our more viscid American species of "Catchfly" (*S. Pennsylvanicum*, for example) possess any such digestive properties?

The January number of the *Revue Mycologique*, which now includes in its scope the subject of lichenology, contains articles by the editor on *Rupinia Baylacii;* the *Peronospora* of the Vine; an Unexpected Occurrence of the White Variety of *Cantharellus aurantiacus; Agaricus campestris* and its Numerous Varieties; the Anomalies exhibited by *Agaricus acerbus and equestris;* and a Revision of the "Reliquiœ Libertianæ." Dr. Passerini describes 18 new species of Italian fungi; Baron Thümen contributes a second decade of exotic fungi; and Dr. Müller gives an enumeration of all the Egyptian lichens that are known up to the present time. The remainder of the number is taken up with the bibliography of fungi and lichens. It would prove a great convenience to readers if M. Roumeguère should have his *Revue* stitched instead of issuing it, as at present, in loose sheets.

In the February number of the *Botanical Gazette*, Prof. Thos. C. Porter contributes a note on *Viola tricolor* var. *arvensis*, in which he urges that this plant has strong claims to be regarded as a native. In fact, the evidence in favor of such a view seems to be gradually increasing. We know of at least one New York station for this violet whither it is impossible that it could have escaped from a garden. Under the name of *Viola tenella* the plant figures in Dr. Torrey's list of plants collected by Dr. James during Long's Expedition to the Rocky Mountains in 1820. It was found growing along the Missouri in a district of country which at that early period must have been a wilderness. The other original notes in the *Gazette* are on *Lepidium campestre*, by Rev. S. Lockwood: on *Asplenium Bradleyi*, by Prof. F. L. Harvey: Bursting of the Fruit of *Euphorbia corollata*, by W. C. White; and a Reply to Mr. Meehan's Criticisms, by M. E. Jones. In these notes Mr. Jones modifies his opinion expressed in a former

number, that *Malvastrum coccineum* proves poisonous to sheep which eat it.

The question as to how long the seeds of different plants preserve their vitality when buried at considerable depths in the soil is one that has been much discussed but not sufficiently investigated ; and facts bearing on this subject are therefore always of interest. In a recent number of the *Garden* a correspondent gives an instance which came under his notice, in which the seeds of several species of *Solidago* apparently remained dormant for twenty years. The ground had been covered with shrubs and carefully kept free from weeds during that time ; at its expiration the ground was cleared, and two years afterwards it was covered with specimens of *Solidago* three or four feet in height.

In an interesting paper on "Changes in Plant Life on the San Francisco Peninsula," read before the San Francisco Academy of Sciences, Feb. 2d, by Dr. Herman Behr, and published in full in the *Mining and Scientific Press* of Feb. 21st, the author points out the fact that in 1850 there were three original types of landscape which could well be distinguished on the peninsula. After enumerating the plants which characterized these three types, he goes on to state that the latter are now no longer distinguishable, the improvements of a growing city having brought them all to the same level. The original arborescents have been cut down partly for fuel, and partly to make room for houses. Horticulture has replaced them with the conifers of the Sierras, and the evergreens of Australia, The vegetation of the peninsula is at present more Australian than Californian. But it is not only the quick growth of the city, the sudden change of grade, etc., that have disturbed the original equilibrium in nature, for there still exist places enough where an original vegetation could have remained undisturbed, and where it was protected even against the attacks of domestic animals. One of the most powerful agents in the destruction of the original flora is the invasion of foreign plants. Parallel with the artificial introduction of Australian arborescents has come an immigration of herbaceous plants from Europe and Africa, against which the native vegetation has very little power of resistance. "First of all;" says Dr. Behr," I mention *Silybum Marianum*, a native of the Mediterranean region, observed by me the first time in 1854 in California, and in 1848 in South Australia. Wherever it gets a hold of the soil all native vegetation disappears. California is not the only land infested by this thistle. I have witnessed the same invasion in Australia, and have read the statement of my former teacher, Prof. Burmeister, at present in Buenos Ayres, that the same thistle protects, at the time of its vegetation, the settlers against the inroads of the Pampas Indians, as even the wild horsemen cannot cross the immense thickets formed by this plant." Another weed, *Cotula coronopifolia*, does the same work in moist ground as that begun by the *Silybum* in the more arid tracts of soil. This plant is a native of Africa, and made its appearance in California about 1854. This weed has transformed the varied aquatic vegetation of the places infested by it into one monotonous green mass with yellow buttons. The graceful floating *Azolla*, which formerly ornamented the creeks

is scarcely to be found any more. Both of these foreigners, which may be called "the coming plants," belong to the Compositae, an order characteristic of the most modern flora. "Now it appears that in the fight for existence the junior sons of creation have a decided advantage; and this accounts for the otherwise inexplicable circumstance that the variety of organisms decreases so perceptibly when we enter the realms of Gymnosperms, vascular Cryptogams, and all those forms of organic life that existed already in the early periods of the earth."

The last numbers received of the *Botanische Zeitung* (Nov. 5 and 6) contain an illustrated paper by F. Hegelmaier "On the Embryogeny and Development of the Endosperm of Lupinus."

In the *Comptes Rendus* of Jan. 12 (p. 58) will be found an interesting and useful paper on the "Evolution of the Inflorescence in the Gramineae," by M. H. Trécul.

The *Journal of Botany* for February has the following table of contents: John Miers (with portrait), by W. Carruthers, F. R. S.; Alabastra diversa, by S. Le. M. Moore; Notes on the Flora of Northamptonshire, by G. C. Druce, F. L. S.; Two Additions to the British Moss-list, by H. Boswell; Two New Bromeliads from Rio Janeiro, by J. G. Baker, F. R. S.; Hampshire Botany, by F. Townsend, F. L. S.; and Notes on the Botany of the British Polar Expedition of 1875-6, by H. C. Hart, B. A.

The *Contemporary Review* for February contains an interesting and instructive article by Prof. St. George Mivart on the "Geography of Living Creatures." It seems rather odd to an American botanist to see *Ampelopsis quinquefolia* classed among trees, as it is in this article; and it is rather curious, too, to see the persistency with which some of our English cousins cling to that genus "Wellingtonia," when they have occasion to refer to our big California trees —the *Sequoiae*.

Hardwicke's *Science Gossip*, which is always interesting to the naturalist, treats of the following botanical subjects in the February number: "Some Probabilities Respecting Organic Species," by W. S. Palmer; "Notes on Phyllotaxis" (illustrated), by H. W. Syers; and "Primroses and Violets," by R. M.

The *American Monthly Microscopical Journal* for February contains an article by Dr. F. Wolle in which he points out the fact that the fresh-water algae are quite often the subjects of pecular transformations in the course of their life-history. To aid the beginner in his studies the author, in this short paper, explains some of the fallacious appearances that are likely to be met with among these cryptogams.

§ 30. **Juncus setaceus,** Rost.—I have received specimens of *Juncus setaceus*, Rost., from Norfolk, Va., collected by Mr. H. P. Worcester. This is, I believe, the most northern authentic station reported for this rush, the Pennsylvania locality of Rostkovius being questioned in Gray's manual. N. L. B.

§ 31. **Errata.**—In the February number, there occurred the following typographical errors, which should be corrected as follows: 1st page, line 17, insert "as if," after "seemed"; line 38, read "evolution"; p. 17 line 15, insert "here" after "we"; p. 22, line 47, for "Tübigen" read "Tübingen"; p. 23, line 29, "substraction", set up thus by the printer in a moment of abstraction, should be "subtraction."

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII.] New York, April, 1880. **[No. 4.**

§ 32. **Proceedings of the Torrey Club.**—The regular monthly meeting of the Club was held at the "Herbarium," Columbia College, Tuesday evening, April 13, the President, twenty-eight members, and eight visitors being present.

Mr. Leggett announced the death of Mr. C. F. Austin, an esteemed member of the Club, and called attention to the destitute condition of his family. On motion it was resolved to purchase from the widow a set of the *Musci Appalachiani* and *Hepaticae Boreali-Americanae.*

Mr. Britton of the Herbarium Committee announced the receipt from Mr. A. Brown of 250 specimens of ballast plants, collected in New York city and vicinity.

Prof. D. S. Martin exhibited and remarked upon a section of the trunk of a tree fern. Remarks upon the structure of the same were also made by Mr. Jos. Schrenck.

Prof. A. Wood exhibited the fruit of *Rhus diversiloba*, T. & G., from California, and of *Sapindus marginatus*, Willd., from Southern Kansas—the latter being a hitherto unreported habitat for this plant.

Dr. Kunze exhibited a specimen of *Eucalyptus globulus*, consisting of leaves and flower buds, and made explanatory remarks thereon.

Mr. Gerard exhibited a monstrous specimen of *Sophora Arizonica*, Wats., from Texas, in which the peduncle was flattened and spread out in a fan-like manner at its extremity.

Mr. Bicknell read a paper entitled "Notes on the Flora of Riverdale, N. Y."

Prof. D. S. Martin read a communication from Mr. Jno. M. Batchelder, of Boston, on the "Influence of Electricity upon the Growth of Plants." The author sowed "pepper-grass" seeds on cotton floating on the surface of distilled water contained in two tumblers. One of the tumblers was insulated, and in it was placed a coiled copper wire the other extremity of which communicated with a revolving belt. Both tumblers were placed under the same conditions of light and heat. It was found that the electricity retarded both the germination of the seeds and the subsequent growth of the plants to a remarkable degree. At the conclusion of his experiments Mr. Batchelder discovered that while the roots of the plants in the non-electrified water were growing normally, those submitted to the action of electricity were twisted and coiled in an intricate manner among the fibres of the cotton.

Prof. A. Wood read a paper on "Some Points in Botanical Terminology" wherein he advocated that the terms ordinarily in vogue to designate the venation of leaves should, for philosophical reasons, be discarded; and that in their stead should be substituted the term "midvein" for the principal axis of venation, or prolongation

of the petiole; "veins" for the divisions (if any) of the petiole; "veinlets" for the primary branches sent off from the midvein or veins; and "veinulets" for the secondary branches sent off from the veinlets.

Mr. Bicknell stated that the total number of plants observed by him in flower this year up to date was thirty-five.

Prof. Wood reported that he had received from Dr. E. C. Howe a specimen of *Carex Sullivantii*, Boot, collected near the Croton aqueduct at Yonkers.

M. W. Van Denburg, M. D., of New York City, was elected an active member, and two new names were proposed for membership.

§ 33. **Coe F. Austin** —This well-known botanist died on the 18th of March, 1880, at his home, Closter, New Jersey, where he was born on the 20th of June 1831. His health had been failing for a year, but the close was rather sudden.

After completing his education at Rankin's Pinkerton Academy, Austin, who was endowed with the true mind of a naturalist, devoted his time to the study of Chemistry and Botany. Becoming soon most interested in Botany, he accepted the position of Curator of the herbarium of Columbia College, but abandoned it to give his whole time to the study of the Mosses and Hepaticae, and to the search for and collection of these plants.

Without a sufficient supply of books, but with an incomparable perseverance, he soon became an adept in this department of botanical science, and, helped by Sullivant and other American bryologists, he was able to prepare the publication of his first work on Mosses.

As a collector, Austin pursued his explorations with indomitable energy and remarkable success, enriching the American flora with a large number of species, either new or as yet undiscovered in this country. The first work of his, the *Musci Appalachiani*, is a collection of 450 specimens, raised to 550 by a supplement in 1878, representing above four hundred species, the rest being varieties not less valuable to students.*

Mr. Austin contributed in 1869, an article to the Proceedings of the Philadelphia Academy of Natural Sciences, containing 47 species of Hepaticae. After which time appeared his *Hepaticae Boreali-Americanae* which comprised 150 specimens, 30 of which were varieties, and 15 species previously published.

Work of this kind can be performed only by true devotion to science. It demands a prodigious amount of research in the field for procuring the specimens, and an arduous labor to separate the species, (for mosses mostly grow mixed together) and then for the determination of each specimen, which has generally to be done by microscopical examination. It is therefore easy to understand

* This work is the more valuable since nothing else of that kind can now be obtained for American Bryology, as no copies of the *Musci Alleghanienses* by Sullivant, nor of the *Musci Exsiccati*, by Sulliv. & Lesqr., are left for sale. The few copies of the *Musci Appalachiani* which, if I am well-informed, have been left by Austin will soon be disposed of. The same remarks are applicable to his other important work—the *Hepaticae Boreali-Americanae*.

how much time has to be spent in the preparation of a single set, and what small material advantage can be derived from such undertakings.

Austin's name is well-known by the readers of the BULLETIN, to which he has furnished the descriptions of 110 species of Mosses and Hepaticae. Sixty-four others have been published in the *Botanical Gazette*.

As an anatomist and judge of the character of the Mosses, Austin had a quick perception, but was often disposed to unreliable conclusions, formed too confidently on incomplete materials. He has, therefore, sometimes recalled his first determinations. But who is the bryologist who has done otherwise? A large number of his species, some of them the finest and rarest in the North American Bryology, stand as wonders of his clear discrimination, and he leaves a name dear to American botanists and well-known to European bryologists.

The loss of Austin is especially to be regretted for Hepaticology, of which he was the only representative in this country. He had studied the Hepaticae as his specialty, with the purpose of publishing a Synopsis, which time only prevented him bringing to completion.

L.

[Mr. Austin left sets of his Musci, and Hepaticae, all labelled and accompanied by a catalogue and index. His private collection contains very numerous specimens of each species, with his notes upon their various forms in different localities. It would be an invaluable aid in making critical researches in this field of enquiry, and should be acquired by some scientific institution. Those who make a study of these subjects ought to be prompt in procuring sets, both for their own sakes and for the sake of the family of this devoted scientific worker. The prices are given in the advertising page of this sheet.]

§ 34. **The Genus Pinus.**—*Revision of the Genus Pinus and description of Pinus Elliottii, by Dr. George Engelmann*, from the Transactions of the Academy of Science of St. Louis, February, 1880, with three beautiful plates illustrating P. Elliottii, drawn on stone by P. Roetter.

With indomitable courage, patience and skill, Dr. Engelmann attacks one after another the Doubting Castles of Botany and generally succeeds, if not in utterly demolishing them, at least in opening to the light their most gloomy dungeons. Mr. Bebb will probably claim that Salix offers a more stubborn and more extensive obstacle than Pinus, but the latter was far enough from being reduced, before Dr. Engelmann sat down before it. It is claimed that the present arrangement is as natural a one as any that can be devised, and that by it, to some extent, even geographical alliances are best preserved.

Dr. Engelmann finds, "with Endlicher, the most valuable character in the fruit scale," or, to speak more correctly, "that the fruit scale in this genus corresponds with a series of other characters which constitute two very natural sections of the genus" *Strobus* and *Pinaster*. The more or less thickened exposed part of this scale, called the apophysis, is rather depressed and terminates in a blunt point in *Strobus;* in *Pinaster*, it bears its point on the usually more thickened back, the *umbo*, mostly armed with a prickle or spur, sometimes early deciduous.

The subsections are distinguished by the position of the resinous ducts within the leaf. These ducts, normally two, but very often numerous, lie amid the chlorophyll-bearing parenchyma cells, between the thick epidermis and the sheath which surrounds the vascular bundles. When close to the epidermis the ducts are called *peripheral;* surrounded on all sides by the parenchyma, *parenchymatous;* close to the sheath around the vascular bundles, *internal* ducts. The use of this position of the ducts is the main new point in the present classification. It is believed to be constant and intimately connected with the essential character of the plant. The difficulties attendant upon its use are: *first*, that "in some few species smaller accessary ducts do occupy an abnormal position; *secondly*, that "in pines with very slender leaves it is sometimes difficult to discover the ducts," and in some forms perhaps they are really absent, especially in cultivated specimens; and, *thirdly*, that sometimes the parenchyma separating them from the epidermis or vascular sheath is so thin a layer that *parenchymatous* ducts may be mistaken for *peripheral* or *internal*. The other distinctions though mostly more obvious are less natural, only the presence or absence of hypodermal or strengthening cells is difficult of appreciation and of doubtful value. We proceed to give a somewhat abridged account of the arrangement, but of course the students of pines will not be satisfied with less than the complete monograph with all its details. Dr. Engelmann includes only such species or (sub-species) as he has been able to examine himself: "the list, however, will be found nearly complete." The numbers prefixed to the species are additions of our own.

SECT. I. STROBUS.

§ 1. **Eustrobi.**—Ducts peripheral. Northern or mountain species of the Old and New World.

* Wings longer than the seed.

1. P. Strobus, 2. monticola, 3. excelsa, 4. Peuce, 5. parviflora, 6. Bonapartea, 7. Ayacahuite, 8. Lambertiana.

** Wings much shorter than seeds.

9. P. flexilis, (10. albicaulis), *11. pygmaea.

§ 2. **Cembrae.**—Ducts parenchymatous—Europe and principally Asia.

12. P. Cembra, 13. Mandschurica, 14. Koraiensis.

SECT. II. PINASTER.

A. Ducts peripheral. *a.* Cones subterminal.

§ 3. **Integrifoliae.**—Leaves smooth-edged, their sheaths deciduous.—Western North America and Mexico.

* Cones short globose; scales unarmed; seeds large with a minute wing.—*Cembroides.*

15. P. Parryana, 16. cembroides, 17. edulis, 18. monophylla.

** Cones oval or elongated; scales armed; seeds much shorter than the wing.—*Balfouriana.*

19. P. Balfouriana, (20. artistata.)

§ 4. **Sylvestres.**—Leaves serrulate, their sheaths persistent.—Europe and Asia, one species in America.

* Leaves in threes.—*Indicae.*

21. P. Khasia, 22. insularis, 23. longifolia.

** Leaves in twos. Cones and seeds small; wings large.—*Eusylvestres.*

24. P. sylvestris, 25 montana, 26. resinosa, 27. densiflora, 28. Massoniana, 29. ? Merkusii.

*** Leaves in twos. Cones and seeds large; wings rudimentary. A single Mediterranean species.

30. P. Pinea.

b. Cones lateral.

§ 5. **Halepenses.**—Old World.

* Leaves in threes; sheaths deciduous; umbo very prominent; wings shorter than the large seeds. *Gerardianae.*—Asia.

31. P. Gerardiana, 32. Bungeana.

** Leaves in twos; sheaths persistent; cones smoothish; wings much longer than seeds. *Euhalepenses.*—Mediterranean regions.

33. P. Halepensis, 34. Pyrenaica.

B. Ducts parenchymatous. *a.* Cones subterminal.

§ 6. **Ponderosae.**—Mostly American with three Old World species.

* Leaves in fives; ducts usually free of strengthening cells; *Pseudostrobi.*—Central America and Mexico to Arizona and California.

35. P. leiophylla, 36. tenuifolia, 37. filifolia, 38. Pseudo-Strobus, 39. Montezumae, (40. Hartwegii), 41. Torreyana, 42. Arizonica.

** Leaves in threes, sometimes in fours or fives; sheaths persistent; strengthening cells under the epidermis, around ducts. *Euponderosae.*—Northwestern America, Mexico and Canary Islands.

43. P. Engelmanni, 44. ponderosa, (45. Jeffreyi), 46. Canariensis.

*** Leaves in threes; sheaths deciduous.—Mexico and Arizona.

47. P. Chihuahuana.

**** Leaves in twos. *Lariciones.*—Europe to Asia and W. America.

48. P. Laricio, (49. Austriaca), 50. Thunbergii, 51. contorta, (52. Murrayana.)

b. Cones lateral.

§ 7. **Taedae.**—Mostly American, only one Old World species.

*. Leaves in threes. *Eutaedae.*—North America to Mexico.

53. P. Sabiniana, 54. Coulteri, 55. insignis, 56. tuberculata. 57. Taeda, 58. rigida, (59. serotina), 60. Greggii. 61. Teocote. 62. patula.

** Leaves in twos; cones with very stout prickles. *Pungentes.*

† Ducts without strengthening cells.—North America.

63. P. inops, (64. clausa), 65. pungens, 66. muricata.

†† Ducts surrounded by strengthening cells.—Southern Europe.

67. P. Pinaster.

*** Leaves in twos, or in the first often also in threes; cones with weak or deciduous prickles. *Mites.*—Eastern North America.

68. P. mitis, 69. glabra, 70. Banksiana.

c. Ducts internal.

§ 8. **Australes.**—Leaves in twos to fives. Timber very heavy and resinous.—Southeastern North America, West Indies, and one species in Mexico.

* Cones subterminal; leaves in threes to fives. *Euaustrales.*

71. P. oocarpa, 72. occidentalis, 73. australis.

** Cones lateral or mostly so; leaves in twos to threes. *Elliottiae.*

74. P. Elliottii, 75. Cubensis, 76. Wrightii.

Notes.

Nos. 15–18. *Cembroides.* Dr. Englemann considers it an open question whether these four species may not properly be united into one.—19, 20 must be united.—21–23. a very natural group.—27. *P. densiflora*, Sieb. & Zucc., sometimes cultivated under the name of the following.—28. *P. Massoniana*, Lamb. Parlat., not Sieb. & Zucc., or Endlich., that is No. 50, *P. Thunbergii*, Parl.—29. *P. Merkusii*,

Jungh. & De Vriese, with poor specimens the affinity of this species was not certainly determined.—34. *P. Pyrenaica.* Lapeyr. fide Parlatore, not to be confounded with 48, *P. Laricio*, Poir., as has been done, even by Lapeyrouse himself.—39. *P. Montezumae*, Lamb., species not sufficiently circumscribed.—43. *P. Engelmanni*, Carrière. Wislizenus brought a single specimen from the mountains west of Chihuahua.—46. *P. Canariensis*, Ch. Smith, perhaps more nearly related to *P. Laricio*, Poir. The articulation of the four involucral bracts is a curious feature which it has in common with our *P. resinosa*, Ait.—53. *P. Murrayana*, Balf., is only a broader leaved mountain form of *P. contorta*, Doug,—56. *P. tuberculata*, Gordon, not of Don, which is a form of *P. insignis*, Doug.—67. *P. Pinaster*, Ait., except by the position of the female ament, more nearly allied to *P. Canariensis*, less so to *P. Laricio.*—74. *Pinus Elliotti*, Engelm., imperfectly known to Elliott, was rediscovered about ten years ago by Dr. Mellichamp, and is here fully described and illustrated.

§ 35. Fresh Water Algae, IV.

The pursuit of my recreation, the natural history of Fresh Water Algae, has revealed to me, during the past year, new points of interest in the development and growth of a few, and brought to light, out of their hitherto hidden abiding places, many which previously had not been recorded as dwelling in our land.

The following list of upwards of one hundred plants, embraces at least ninety which are new to the United States Flora, and of which eighteen were wholly unknown. About fifty were collected in New Jersey. This State, which has won a wide reputation for its peculiar richness in phenogamous plants, also appears in the small portion thus far explored, to be richly stocked with cryptogams.

When the locality is not given in the list, it is to be understood that the plant was found in the vicinity of Bethlehem, Pa. Some were collected in the neighborhood of New York, and others in Massachusetts, Connecticut, Iowa, Florida, etc.

To the collectors whose names are mentioned, I return cordial thanks, alike for what they have done, and for their promises of further favors. I am happy also in having several new volunteers, who await the opening of the season to begin their explorations. To O. Nordstedt, of Lund, Sweden, I am especially indebted for valuable suggestions, and for many desirable extracts from his extensive library of botanical works.

FRANCIS WOLLE.

BETHLEHEM, PA., March, 1880.

PHYCOCHROMOPHYCEAE.

Oscillaria, Bosc.—O. subfusca, Vauch. Wet gneiss rocks.—O. Porettana, Menegh. Shaded limestone rocks.—O. tenuis, Ag. Dripping rocks. O. Grateloupii, Bory. Submarine waters, New York. Coll. R. Hitchcock.—O. subsalsa, Ag., *var.* dulcis, Ktz. Antigua, W. I. Coll. B. Romig.—O. natans, Ktz. Ponds, New Jersey.—O. Froellichii, *var.* phormidioides, Rabenh. Swartwout Lake, &c., New Jersey.

Phormidium, Ktz.—P. arenarium, Ag. Florida. Coll. J. D. Smith.

Microcoleus, Desmaz.—M. gracilis, Hass. Dakota, per Dr. Hobby of Iowa City.

Sphaerozyga, Ag.—S. Ralfsii, Thw. Ponds.

S. saccata, n. spec.—S. trichomatibus in thallis tubulosis, cylindrico-elongatis, simplicibus, decem plus minus aggregatis, unciam usque ad palmam longis, 2–3 lineas crassis, varie constrictis vel undulato-sinuosis, gelatinosis vel submembranaceis, mollibus, initio affixis, mox libere natantibus et multum contractis ; trichomatibus subrectis, paralleliter aggregatis vel leniter curvato-implicatis ; articulis oblongis, saepe subcylindraceis, aerugineis, arcte conexis ; sporis numerosissimis, cylindricis, sordide aerugineis, diametro 2–3-plo longioribus ; cellulis perdurantibus globosis vel ovalibus, articulorum diametro paulo vel duplo majoribus. Diam. art. .0016″–.002″. Spor. diam. .003″ ; long. .006″–.009″. Hab. in stagnis, New Jersey.

This plant was found freely distributed along the shores, and in the shallow waters of Cranberry Pond, N. J. It is peculiarly distinct in the cylindrical, vertical, sack-like growth of the thallus, one to three inches high.

Tolypothrix, Ktz.—T. Aegagropila, Ktz. Coll. J. S. Adam, Lime Rock, Conn.

T. bombycina, n. sp. T. castaneo-brunnea, trichomatibus pseudoramulisque leniter curvatis, laxe intricatis, elongatis, basi breviter concretis, internis brunneis ; modo distincte modo indistincte articulatis ; articulis subtilissime granulosis, diametro (.00048″–.00055″) equalibus, vel duplo brevioribus ; vaginis arctis, luteolis, lævissimis ; cellulis perdurantibus, semper basilaribus, subglobosis, singulis, vel 2–3-seriatis.

Forms a dark brown silky stratum on wave-washed stones, along the shores of Hopatcong Lake, New Jersey. According to earlier authors this plant would be a *Calothrix.*

Gloiotrichia, Ag.—I have found a very singular form of propagation in a plant of this genus. The spore contents break through the base, enter into the heterocysts ; these enlarge, change color from yellowish to bright green, and thus become sporangia, which reproduce the gelatinous cysts in which the original form is developed.

CHLOROPHYLLOPHYCEAE.

Gloeococcus, A. Br.—G. mucosus, A. Br.

Dictyosphaerium, Naeg.—D. reniforme, Bulnh. Pond, N. J.—D. Ehrenbergianum, Naeg. Coll. R. Hitchcock, N. Y.

Caelastrum, Naeg.—N. sphaericum, Naeg. Ponds, N. J.

Ophiocytium, Naeg.—O. cochleare, A. Br., Ponds.

Eudorina, Ehrb.—E. elegans, Ehrb.

DESMIDIACEAE.

Closterium, Nitzsch.—C. Lunula, Muller. Common but not heretofore noticed.—C. decorum, Breb. Not infrequent.

Pleurotaenium, Naeg.—P. coronatum, Breb.—P. Ehrenbergii, Ralfs.

Spirotaenia, Breb.—S. obscura, Ralfs. Ponds, N. J.

Sphaerozosma, Corda.—S. secedens, De By., Brown's Mills, N. J.

Cosmarium, Corda. The following were collected in ponds, partly in New Jersey and partly in Penn.—C. sinuosum, Lund. A small variety.—C. tumidum, Lund.—C. tinctum, Ralfs.—C. Smolandicum, Lund.—C. sulcatum, Nordst.—C. venustum, Breb.—C. polygonum, Naeg.—C. homalodermum, Nordst. A small form. Coll. H. S. Kitchell, Conn.—C. parvulum, Breb.—C. cruciatum, Breb.—C. Ungerianum, Naeg.=C. oligogongrus, Reinsch.—C. Ralfsii, Breb.=C. Meriani, Reinsch, *var.* pentagona, Nordst.—C. Turpinii, Breb.—C. Hammeri, Reinsch.— C. anisochondrum, Nordst.—C. Thwaitesii, Ralfs, *var.* Holmiense. Coll. R. Hitchcock, New York.

Euastrum, Ehrb.—E. affine, Ralfs.—E. Pokornyanum, Grun.—E. abruptum, var. evolutum, Nordst.—E. binale, *var.* insulare, Wittr.

E. Donnelli n. sp. E. mediocre, late ovatum, longius quam latius; medio profunde constrictum, sinu angusto lineari; semicellulis trilobis; lobis basilaribus, orbiculo-tumidis; lobo polari subito contracto (semi-diametro) sub-hemisphaerico; dorso subtruncato. Lobis singulis in margine cum mucronibus tribus vel quatuor armatis. Semi-cellulis singulis cum quinque tumoribus instructis; tribus in seriem simplicem transversam in inferiore parte, duabus in superiore parte. Cytiodermate subtiliter punctato. Diam. long. .00216″; lat. 0018″. Hab. Florida. Coll. J. D. Smith.

E. formosum, n. sp. E. mediocre, diametro subduplo longius, ovale; semi-cellulis sex marginalibus lobis, vel prominentiis; sinibus introrsum rotundatis; lobis in apice profundis trifidis, vel tridentatis; dente centrali recto, et lateralibus divergentibus; lobis inferioribus plus minus elementariis. Cytiodermate laevi. Diam. long. 0025″; lat. 0016″. Hab. Ponds, near Toms River, New Jersey.

Micrasterias, Ag.—M. mucronata, Dixon.—M. angulosum, Hantzsch.

M. Kitchellii, n. sp. – M. magna, circiter tam longa quam lata, sinu acuto, introrsum valde amplicato; semi-cellulis profunde trilobis; lobis basilaribus sub-conico-productis, oblique et late truncatis; angulis duobus spinis divergentibus armatis; lobo polari a lobis basilaribus sinu amplo ac rotundato discreto, vertice plus minus convexo, utrinque duabus spinis divergentibus armato. Diam. lobis basilaribus lat. .005″; lobis polaribus .003″. Cell. long. .005″.

The general outline of this plant is near *M. adscendens*, Nordst. found on the Sandwich Islands, but it is larger, the polar lobe is more exserted, and hence the sinuses between it and the basal lobes are much wider and deeper, broadly rounded, not "amplo-acutangulo." The angles are not bidentate, but are furnished with two diverging spines. Collected by H. S. Kitchell in a small pool adjoining Gelder's Pond, on Mt. Everett, Mass., about 1800 feet above sea level.

M. fimbriata, Ralfs, var. *nuda, n. var.* M. permagna orbicularis, laevis; lobulis lateralibus plerumque obtusis, emarginatis, praeter lacinulam sinui proximam quae est paulum conico-producta, in apice duabus spinis divergentibus armata.

The peculiarity of this plant is in the absence of the fimbriae, or spines, except at the angles of the polar lobe, and on the apex of the subdivision next the sinus between the semi-cells. Occasionally one or another of the small subdivisions has rudimentary points. Having examined 25 to 30 plants all bearing out the same character, it is deemed worthy of a record. Collected in the same habitat with the preceding.

Staurastrum, Meyen,—St. muricatum, Breb.—St. rugulosum, Breb. —St. scabrum, Breb.—St. cyrtocerum, Breb.—St. brachycerum, Breb.—St. tricorne, Menegh.—St. leptocerum, Nordst.—St. cuspidatum, Breb.—St. asperum, Perty.—St. pygmaeum, Breb. St. echinatum, Breb.—St. Arachne, Ralfs.—St. Sebaldi, Reinsch. These were collected in ponds in Eastern Pennsylvania, and in New Jersey, and were not noted in previous list. The following new forms are from the same districts.

St. pulchrum, n. sp.—St. parvum, cytiodermate laevi vel subtilissime punctato; semi-cellulis introrsum ventricosis, dorso plus minus arcuatis vel rectilinearibus undulato-crenatis : angulis in radium lanceolatum obtusum productis, a vertice pentagoneis, angulis radiatis; radiis hastatis, obtusis, inter basis sinu semicirculari. Diam. c. rad. .0015″–.0016″ Hab. in lacu, Brown's Mills, N. J.

St. Nova-Caesareae, n. spec.—St. mediocre, circiter tam longum quam latum vel paulo longius, granulatum, angulis in aculeos geminos validos subulatos longe productis ; semi-cellulis a fronte ellipticis, margine ambitu crenato-verrucosis ; a vertice quadrangularibus, angulis mammillatis, aculeo gemino imposito. Diam. sine aculeis, lat. .0015″–0016″ ; long. .0026″–.003″. Cum acul. lat. .0025″–0028″.

St. tricornutum, n. spec. St. magnum, tam longum quam latum, superficie laevi ; semi-cellulis late ellipticis, utroque fine in tres aculeos, achroos, diametro cellulis duplo breviores, divergentes, elongatis; dorso tribus aculeis similibus armatis; a vertice triangularibus, lateribus modo leviter concavis, modo paullum convexis, angulis in tres aculeos instructis. Diam. sine aculeis .0036″–004″; cum ac. .007″–008″.

St. macrocerum, n. sp. St. magnum, granulato-asperum, semi-cellulis introrsum ventricosis, dorso leniter rotundatis vel truncatis ; angulis in cornu rectum vel incurvatum provectis ; a vertice polygonis, sex-vel rarius septem-radiatis ; radiis elongatis, linearibus, achrois, apice trifido. Diam. c. rad. .0025″–0053″. Hab. in lacubus, New Jersey.

St. fasciculoides, n. sp. St. mediocre, dimidio circa longius quam latius, granulatum ; semi-cellulis ellipticis, dorso, rotundatis, ex ventre recte productis, et isthmum latiorem semi-diametro formantibus; a vertice triangularibus; lateribus plerumque rectis, margine prominentiis brevibus, apice 2–4 dentato vel cuspidato, munitis; isthmo similiter armato ; angulis truncatis, aculeis duobus vel tribus, acute conicis, instructis. Diam. lat. .00116″ ; long. .0015″.

St. subarcuatum, n. sp. St. mediocre, granulatum, fere tam

longum quam latum, medio profunde constrictum, sinu acutangulo ampliato ; semi-cellulis a fronte visis ellipticis divergentibus, quasi obverse lunatis, granulis in series transversas ordinatis ; angulis productis bifidis achrois ; dorso papilloso angustato producto, et late truncato ; semi-cellulis a vertice visis triangularibus; angulis rotundatis brevi mucrone imposito ; lateribus aut rectis, aut leviter concavis, in medio papillis ornatis, nonnunquam productis bifidis. Diam. .0013″-.0015″.

The nearest approach to this plant is a form found in Norway, and described by Mr. Nordstedt under the name of *St. arcuatum*. The papillae are sometimes distinctly seen arranged in a circle of which 4–6 present themselves as marginate ; these are sometimes elongated and bifid.

St. comptum, n. sp. S. parvum, granulatum, sinu amplissimo ; semi-cellulis subfusiformibus, dorso convexis, isthmo cylindrico plus minus elongato conjunctis, a vertice 6 radiatis; radiis strictis, apice subtricuspidatis. Diam. lat. 00116″ ; long. 0015″.

St. pusillum, n. sp. S. perexiguum, oblongum, rectilineare ; sinu indistincto ; angulis in cornua divergentia productis ; a vertice quadrangulare ; angulis radiatim productis. Diam. lat. .0003″ ; long. .00055″ ; cum cornu duplo longiore.

Xanthidium, Ehrb. X. Antilopaeum, Breb. *var.* triquetrum, Nordst. Similar to a form found in Brazil.—X. Arctiscon, Ehrb.=Staurastrum Arctiscon, Lund.=St. munitum, Wood.

Arthrodesmus, Ehrb.—*A. fragilis, n. sp.* A. sublaevis mediocris, profunde constrictus ; aculeis subulatis strictis ; semi-cellulis subsphaericis, vel late ovalibus (lat. 0015,″ long. 0013″) utroque fine aculeo longo recto instructis ; aculeis plerumque deciduis. Diam. cum aculeis ad .0045″. Hab. in stagnis prope Hammonton, New Jersey ; Aug. 1879.

ZYGNEMACEAE.

Spirogyra, Link.—S. stagnalis, Hilse.—S. intermedia, Rabh.

Zygogonium, Ktz—Z. pectinatum, Ktz.

Zygnema, Ktz.—Z. leiospermum, de By.

Pleurocarpus, A. Br.—*P. tenuis, n. sp.* P. cellulis diametro (0008″–001″) plerumque equalibus, rarius duplo longioribus, obscuro-viridibus vel atro-purpureis, sterilibus. Hab. in lacubus, New Jersey.

I sent this plant out when first discovered as a Zygnema. Later collections prove it to be a distinct species as named.

Vaucheria, DC.—V. racemosa, Walz. Fine specimens. Coll. by Dr. Hobby, Iowa City.

Conferva, Link.—C. tenerrima, Ktz.—C. abbreviata, Rabenh.

Rhizoclonium, Ktz.—R. fluitans, Ktz. Frequent in streams in N. J. —R. flavicans, Jürg.—R. Casparyi, Harv.

Oedogonium, Link.—O. flavescens, Hass. Atsion, N. J.—O. decipiens, Wittr. and O. crassum, Wittr. Coll. by Dr. Hobby, Ktz., Iowa City.—O. cryptoporum, Wittr., frequent.–O. stagnale, Wittr., from Bound Brook, N. J.—O. fragile. Wittr. Coll. Dr. Beardslee, Ohio, and J. D. Smith, Florida.—O. polymorphum, Wittr. & Lund,

Brown's Mills, N. J.—O. laeve, Wittr. Hopatcong, N. J.—O. plusioporum, Wittr., Waterloo, N. J.—O. ciliatum, Hass, Atsion, N. J.

O. Donnelli, n. sp.—O. oogoniis singulis, subglobosis; oosporis echinatis, oogonia fere complentibus, globosis, echinis conicis; androsporangiis 4–10-cellularibus; nannandribus bicellularibus, paullulum curvatis, stipitatis, in cellulis suffultoriis sedentibus. Crassit. cell. veget .0023″–.0025.″ Altit. 1–2-plo major. Oogon .003″–.0033″; oospor. c. echin. .0028″–.003.″ Coll. J. D. Smith, Florida, 1879.

Bulbochaete, Ag.—B. monile, Wittr. and Lund. Hopatcong Lake, N. J.

Hormiscia. Aresch.—H. speciosa, Crouan. Brackish water near N. Y. Coll. R. Hitchcock.

Ulothrix, Ktz.—K. tenerrima, Ktz.—Coll. Dr. Hobby, Iowa.—U. compacta, Ktz. Small pool, Perth Amboy, N. J.

Microthamnion, Naeg.—M. Kützingianum, Naeg. Water troughs, etc.

Stigeoclonium, Ktz.—S. irregulare, Ktz.

Coleochaete, Breb.—C. soluta, Pringsh. Ponds, N. Jersey. Collected fine specimens in various stages of development. The young forms reflect upon the character of *Chaetococcus*, and tell a tale on forms of *Aphanochaete*, and particularly on *Horposteiron* (*Aphanochaete*) *globosa*, Nordst.

Chantransia, Fries.—C. macrospora, Wood. Hitherto found only in S. C. The large pond at Atsion, N. J., abounds with it. Along the shores, it grows on sticks, larger timbers, and the roots of trees extending into the water.

Batrachospermum.—B. vagum, Roth., is also frequent in the same pond.

§ 36. **Note on the Differences between Cyperus ovularis,** Torr., **and C. cylindricus,** N. L. Britton, (with a plate.)

In the BULLETIN for August, 1879, I called attention to the fact that *Cyperus* (Mariscus) *cylindricus*, should be regarded as specifically distinct from *C. ovularis*, and not as merely a variety of the latter. I take this opportunity to figure the most marked differences between the two species on the accompanying plate. Fig. 1 is an umbel of *C. ovularis*, showing its dense globular heads; (B) is a three-flowered spikelet, and (A) an achenium of this species.

Fig. 2 represents an umbel of *C. cylindricus* with its cylindrical heads; (D) is a two-flowered spikelet, and (C) the achenium. Figures 1 and 2 are the natural size; (B) and (D) are enlarged six times, and (A) and (C) are enlarged twelve times.

The specimen of *Cyperus ovularis* from which the figures were drawn, was collected near Norfolk, Va., by Mr. H. P. Worcester; that of *C. cylindricus* I collected myself near Manchester, N. J.

I am indebted to Mr. Arthur Hollick for the beauty and accuracy of the drawings.

N. L. BRITTON.

SCHOOL OF MINES, N. Y., *April 19th*, 1880.

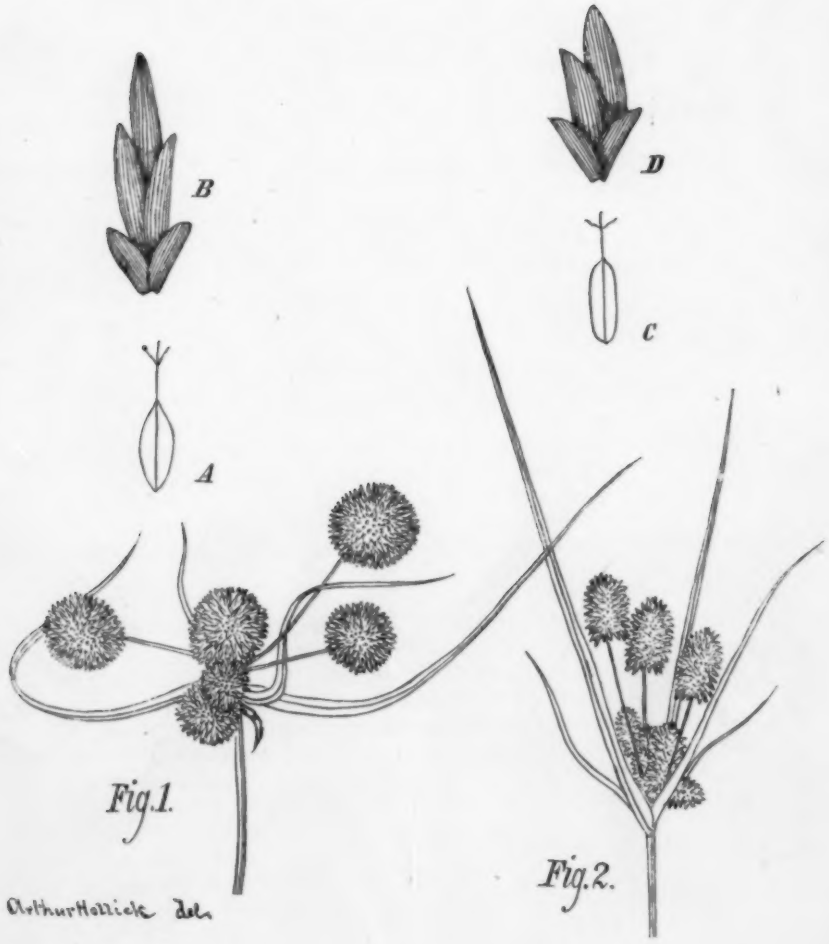


Fig. 1.—CYPERUS OVULARIS, TORR.

Fig. 2.—C. CYLINDRICUS, BRITTON.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII.] New York, May, 1880. **[No. 5.**

§ 37. **Proceedings of the Torrey Club.**—The regular monthly meeting of the Club was held at the School of Mines, Columbia College, Tuesday eveing, May 11th, the President in the chair, There were present 28 members and 9 visitors.

Mr. S. Henshaw exhibited specimens of *Nepenthes Hookeri*, *Anthurium Scherzerianum*, and a large number of tropical orchids and ferns.

Mr. Le Roy exhibited a photograph of Thomas Nuttall; after which the President remarked briefly on the life and scientific labors of this naturalist.

The Herbarium Committee, through its chairman, Mr. Britton, reported that 210 specimens of plants had been received from Mr. Jos. Schrenck, and 75 specimens from Mr. F. Tweedy.

Mr. N. L. Britton was appointed a committee on "Field Days," with power to choose such assistants as he might desire.

Prof. Edward C. H. Day, of New York, was elected an active member.

According to previous announcement, Dr. J. S. Newberry delivered an interesting address on the "Ancient History of the North American Flora", and illustrated his remarks with a large number of fossil plants, which exhibited the successive changes undergone by our flora from the remotest up to the most recent geological times. Brief remarks on the subject of the paper were made by Messrs. Day and Leggett. On motion, the thanks of the Club were tendered Dr. Newberry for his interesting lecture, an abstract of which will appear in our next number.

§ 38. **The North Jersey Botanical Club.**—The first Field Meeting of the season was held at Little Falls, Passaic Co., N. J., on Saturday, May 8th. About forty members were present.

Lunch was taken at the Falls, after which a short business meeting was held, President Rusby in the chair. Arrangements were made for field meetings during the next month.

Among the "finds" were Ranunculus repens, L.; Viola rostrata, Pursh.; Arabis lyrata, L.; Silene Pennsylvanica, Michx.; Phlox subulata, L.; Houstonia caerulea, L.; Erigeron bellidifolium, Muhl.; Viburnum Lentago, L.; Staphylea trifolia, L.; Aralia trifolia, Gray; Hydrophyllum Virginicum, L.; Polygonatum biflorum, Ell.; Vaccinium corymbosum, L.; Geranium maculatum, L.; Uvularia perfoliata, L.; U. sessilifolia, L.; Obolaria Virginica, L.; Orchis spectabilis, L.; and Cypripedium pubescens, Willd.

While few of these plants are rare, yet all show that vegetation this year is from ten to twenty days in advance of its average at this season, and in this locality.

One of the members was fortunate enough to discover a last year's

scape of Aplectrum hyemale, Nutt., and undoubtedly the flowers can be obtained before long.

The next monthly meeting will be held at Millburn, Essex Co., on Saturday, June 12th.

WALTER M. WOLFE, *Secretary.*

Montclair, N. J., *May 12th*, 1880.

§ 39. **A New Fern.**—With some ferns collected in the Chiricahui and Oro Blanco mountains of South-eastern Arizona by Wm. M. Courtis, and placed in my hands by Prof. Gray, I find a new species of *Notholaena*, which I name in honor of one to whom I am indebted for many courtesies, and take advantage of the opportunity thus afforded to show my appreciation of them in this manner.

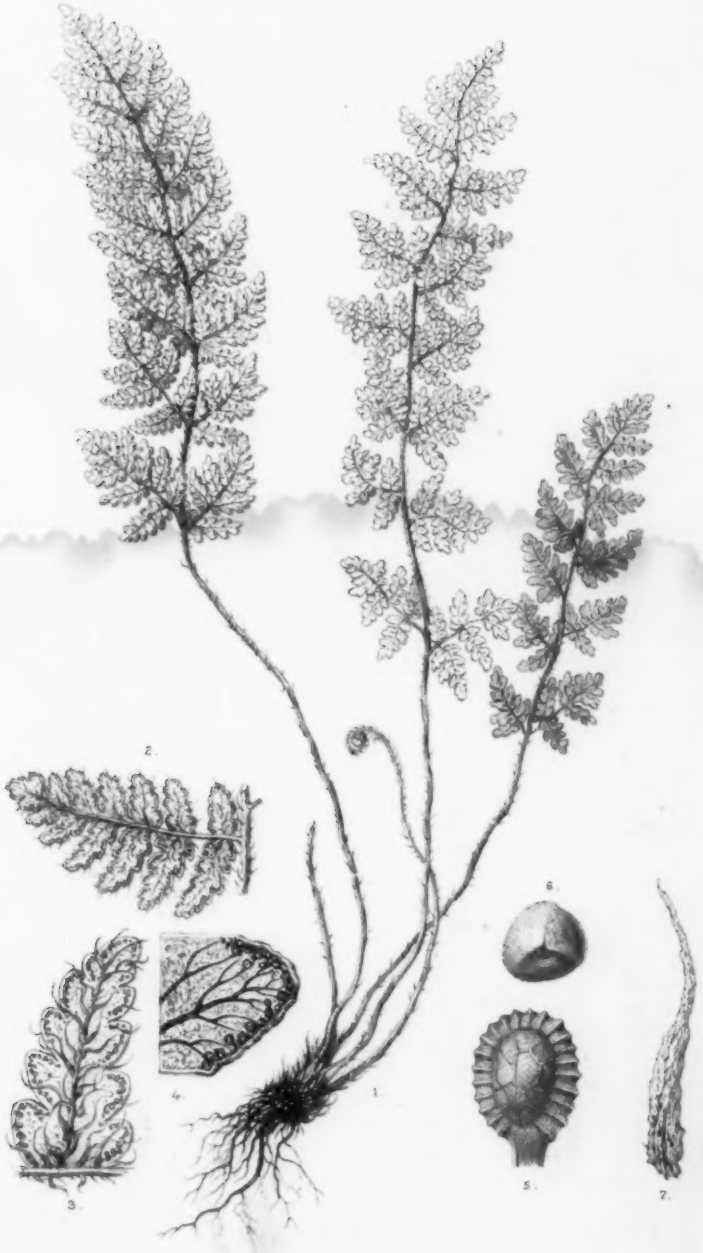
The other ferns collected by Mr. Courtis are *Gymnogramme hispida*, Mett., *Notholaena sinuata*, Klf., *Cheilanthes Wrightii*, Hooker, *Cheilanthes Lindheimeri*, Hooker, and *Pellaea Wrightiana*, Hooker.

Notholaena Grayi, *n. sp.*—Stipes tufted?, 1¼–3½′ long, terete, chestnut-brown, with nearly black, rigid, linear-acuminated scales below, paler, deciduous scales above; fronds 2′–4′ in length, ¾′–1¼′ broad, oblong-lanceolate, once, or twice pinnate, upper surface sparingly, under thickly covered with white powder; rachises brown like the stipes, coated with a granular substance, extending down the stipes, and clothed with long, slender, entire or ciliated pale or whitish scales; pinnae short-talked, oblique, unequally triangular-ovate, ovate-lanceolate or lanceolate in different specimens (lowest pair nearly deltoid and distant, uppermost lanceolate), deeply pinnatified, or pinnately divided into 1 or 2 pairs of short-stalked or sessile, oblong, pinnatifid, obtuse pinnules, the remaining portion obliquely pinnatifid with alternate, lobed or entire segments; margins unchanged, reflexed. Sori brown, in a continuous line at the ends of the free veins.

Hab. Mountains of South-eastern Arizona, growing in clumps on the grassy slopes of the foot-hills. Wm. M. Courtis. February or March, 1880.

A lovely fern, so different from any known species, that, notwithstanding the small amount of material at hand, there can scarcely be a doubt as to its distinct character. In structure it is not unlike *N. distans*, R. Br., but in that species the fronds are hairy, longer, and wholly destitute of powder. Its nearest affinity is with *N. affinis*, Hook., but it is separated from that species by its more compound fronds, and distinct scaly rachises. There is no other species with which it can be compared. Under the microscope, the white powder separates into distinctly stalked gland-like bodies with enlarged conical, flat or inverted heads like a miniature host of fungi with their variously shaped caps. With a power of 200 diameters, or even less, the scales of the frond appear to be composed of elongated, cylindrical, tapering tubes containing a light brown coloring matter, collected into a mass at the base, or in spots at intervals throughout the length of the otherwise whitish scales, which are thus made to appear jointed.

The species is one of the most elegant yet discovered, and I take



C.E. Faxon del. A. Meisel. Lith.

NOTHOLÆNA GRAYI

pleasure in dedicating it to one pre-eminent in American Botanical Science.

Through the kindness of Mr. Faxon I am enabled to accompany my description of the new fern with an admirable drawing, of which I append the following explanation:

Figure 1, plant natural size; Figure 2, pinnæ enlarged; Figure 3, pinnule more enlarged; Figure 4, segment of pinnule showing venation; Figure 5, sporangium x 90 diam.; Figure 6, spore x 250 diameters; 7. scale from rachis of pinna x 25 diameters.

GEO. E. DAVENPORT,

Medford, Mass., *April* 20, 1880.

§ 40. Some of the rarer Plants of our Northern suburbs.

By EUGENE P. BICKNELL.

In the following paper, designed to illustrate some features of the flora of our northern suburbs, I have confined myself to a formal enumeration of species the occurrence of which seems to be of more or less interest. The principal field of my observations has been a limited one, confined to a section of country about half a mile wide, extending inland about two miles from the station of the N. Y. C. & H. R. R., at Riverdale. This region is all embraced within the limits of the 24th Ward of this city, and the water-shed of the Hudson, and where not otherwise specified, the observations apply to it. Occasionally they have been carried on in my neighboring districts, the extreme points of which may be represented by Ft. Washington and Fordham, on the S. W. & S. E., and a little beyond the limit of this city on the north.

The general order of the list follows that of Gray's "Manual."

Anemone Pennsylvanica, L. A bed of this plant grows at the foot of a lightly wooded slope to the Hudson River just above Spuyten-Duyvil. Here I found them in full flower, June 5th last. Also at Sing Sing, some miles from the river.

Thalictrum purpurascens, L., *var.* **ceriferum,** Aust. Sparingly, in woods just beyond the city limits, about 2 miles from the river. Just in flower, June 8, 1879.

Nuphar luteum, Smith, var. **pumilum,** Gray. Grows in inlets of the Bronx River, along Harlem R. R., above Williams Bridge.

Fumaria officinalis, L. A single plant near the track of the Hudson River R. R.

Dentaria diphylla, L. Growing commonly along the bed of a brook flowing into the Hudson, between Spuyten-Duyvil and Riverdale. In recent flower, May 10, 1879.

D. laciniata, Muhl. Grows abundantly within an area several yards in extent, in a glen close to the river. In full flower, May 8, 1879.

Barbarea praecox, R. Br. Growing along a fence, on a grassy slope about ¾ mile from river. Pods an inch long, April 19, 1878.

Sisymbrium Thaliana, Gaud. Common at several places. Plants with small pods, May 4th, 1879.

Hesperus matronalis, L. Along the roadside at Nasholon; also in

woods along river below Manhattanville. Just in flower, May 23, 1879.

Viola odorata, L. has been rapidly increasing for years over a lawn and along a terrace, where the grass in some places has been entirely crowded out. Last year I found it among rocks in woods a quarter of a mile distant. The fragrance is still retained, and it blooms much earlier than any of our indigenous species, being in flower this season by the middle of March.

Hypericum prolificum, L. I found this shrub in full flower last August, growing among briers, and other shrubbery on the border of a small swamp, near the roadside opposite Jerome Park There were apparently several plants, which, if not indigenous, must have been growing there for some time.

Lychnis vespertina, Sibth. Common along Broadway, at Kings Bridge. May 16, 1879, just in flower.

Malva moschata, L. A single plant found growing by the roadside near Woodlawn.

Linum striatum, Walt. Not uncommon in swampy places.

Floerkea proserpinacoides, Wild. A small patch grows in the same glen with *Dentaria laciniata*, and close to the latter plant. Just in flower, May 8, 1879.

Euonymus Americanus, L. Not uncommon. Found at a number of places; both varieties occur. In fresh flower, June 8, 1879.

Staphylea trifolia, L. Rare; in swamp about 1½ mile from river.

Desmodium acuminatum, DC. Common; flowers about July 4th.

Robinia viscosa, Vent. I found a single tree of this species, near an old barn, by a wall in an upland pasture. June 1, 1879, it was in full flower.

Agrimonia parviflora, Ait. Uncommon; Have found it only in one spot.

Geum strictum, Ait. Sparingly in swamp along Broadway; also at Sing Sing.

Rubus odoratus, L. Not uncommon along river. Just in full blossom, June 4, 1879.

R. strigosus, Mchx. Found sparingly at several places where it had probably escaped, though unquestionably indigenous in woods below Inwood, and perhaps at one other locality near Riverdale.

Philadelphus (coronarius?), Seems to be fully established about the borders of a small swamp, across the road from Jerome Park. Here, on June 25th last, I met with a number of shrubs in full blossom growing among clumps of shrubbery in different parts of the swamp, some of which were only accessible by wading.

Lythrum Salicaria, L. Several plants found in border of thicket in field, east of the R. R., between Fordham and Williams Bridge. In full flower, July 22, 1878.

Zizia integerrima, DC. Grows sparingly on wooded slope to the river just beyond Riverdale. Pods almost mature, June 17, 1879.

Aralia spinosa, L. Several of these plants, growing with *Symphoricarpus*, among cluster of trees in deserted orchard; also at one spot on retired road east of Van Courtland Lake.

Lonicera sempervirens, Ait. Climbing high on a single tree, in a

cedar copse, in wood about ¾ mile from river. In brilliant flower, June 9, 1879.

L. parviflora, Lam. Rare ; one or two stations along the river.

Symphoricarpus vulgaris, Mchx. A small clump has grown for years by a fence along Broadway, above Kings Bridge ; also occurs in larger quantities with *Aralia spinosa* in a deserted orchard.

Dipsacus sylvestris, Mill. Abundant along roadside near Williams Bridge. Also at several other places along roads within a mile of the Harlem R. R.

Diplopappus amygdalinus, T. & G. What is unquestionably this species (or variety) grows sparingly not far from Courtlandt Lake.

Solidago squarrosa, Muhl. Sparingly on wooded slope along Hudson, both at Spuyten Duyvil and Riverdale. Also opposite Yonkers on Palisades. Flowering the second week of September.

S. speciosa, Nutt. Typical form on Palisades opposite Yonkers, *var.* **angustata** occurs at the city limits, nearly a mile east of Broadway. In full bloom, Sept. 27, 1879.

Helianthus decapetalus, L. Grows commonly at several localities. The earliest in flower of its genus. July 22, 2879. Just blooming.

H. divaricatus, L. At several places along the river. Aug. 1, 1879, in full flower.

Lampsana communis, L. Occurs sparingly at the border of a small wood near an old residence where it has persisted for years.

Sonchus asper, Vill. Along a branch of the Spuyten Duyvil Creek near Broadway, not far from Kings Bridge.

Gaylussacia frondosa, T. & G. The only station I have discovered for this plant is in woods, at the summit of a steep slope from river, between Ft. Washington and Inwood.

Pycnanthemum incanum, Mchx. Dry hill, about half a mile from river; not uncommon ; also below Inwood, in open woods. **P. muticum,** Pers. Sparingly in open woods, about one mile from river. **P. linifolium,** Pursh. A few plants in open woods between Ft. Washington and Inwood. **P. clinopodioides,** T. & G. Common at one spot near the above.

Lophanthus scrophulariaefolius, Benth. Not uncommon at two localities near Broadway.

Scutellaria pilosa, Mchx. The borders of a thicket just N. W. of Jerome Park is the only spot where I have ever found the plant. Here a scattered group yearly flowers about the last of June.

Origanum vulgare, L. Common along several roads about midway between Hudson and Harlem R. R's, and extending from the direction of the latter.

Thymus serpyllum, L. A small patch discovered on uninhabited wild slope surrounded by woods, perhaps a mile N. of Williams Bridge. Just in flower, Aug. 23, 1879.

Echium vulgare, L. A few plants found along Hudson River R.R.; also a patch by the roadside, between Riverdale and Williams Bridge. In 1877, I found this plant abundant along the Ulster and Delaware R. R. in the Catskills.

Ipomoea pandurata, Meyer. Several fine plants just in flower, Aug 28, 1879, near summit of hill just above Spuyten-Duyvil.

Polygonum Careyi, Olney. Sparingly in ditch along track of Hudson R. R. R., below Kings Bridge. Sept. 7, 1879, just in flower.

P. amphibium, L. With the above, and in flower a little in advance of it.

Betula nigra, L. A tree of four trunks, about 20 feet high, grows in low wood near the city limits, about ½ mile east of Broadway.

B. lutea, Mchx. L. Several trees along a rocky stream between Williams Bridge and Woodlawn.

Zannichellia palustris, L. Marsh near Broadway, above Kings Bridge; also between this station and Morris' Dock.

Spiranthes graminea, Lind. *var.* **Walteri,** Gray. A single plant found in 1878, ¾ mile N. of Kings Bridge. Not since discovered.

S. simplex, [?] Gray, Several plants found on dry grassy ground in Woodlawn Cemetery. Had been in flower some time, Aug. 30, '79.

Calopogon pulchellus, R. Br. Rare; a single plant only.

Liparis liliifolia, Rich. Have found this plant at several localities, both close to the river, and two miles inland, sometimes growing quite abundantly. In flower, May 26, 1879.

Aplectrum hyemale, Nutt. Sparingly in Oliff Park, less than a mile N. W. of Jerome Park. May 1, 1879, full flower.

Cypripedium parviflorum, Salisb. June 1, 1879, a single plant in full flower near the City limits.

Smilax glauca, Walt. Not uncommon.

Polygonatum giganteum, Dietrich. At several localities.

Allium tricoccum, Ait. Found only in a glen by the river where it it is not uncommon. A luxuriantly growing bed of these plants in full flower, July 22, 1879.

§ 41. Teratology.

The study of abnormal growth, besides affording excellent practice in the principles of morphology, is capable also of rendering very important assistance in tracing the derivation of forms, and perhaps in determining whether an existing form is an advance or retrogression. In the new edition of Gray's Text Book a sufficient sketch of the subject is given with reference to the special writers on the subject, but all its bearings have by no means been exhausted, and we are reminded by the following notes to call the attention of students to the close investigation of such cases, remarking that they are not the less interesting because they may have been observed before; in fact, that the frequent repetition of the phenomenon gives a better opportunity for exploring it.

Carya alba, Nutt.—The triangular or triqueous nuts of *Carya alba*, Nutt., noticed in the February BULLETIN by Mr. Britton, are very common here, some trees [Carya alba ?] yielding quite a percentage of the abnormal form. Possibly this form of nut may be more common here than at the East. H. C. B.

Painesville, Ohio.

(The nuts sent us, a cross-section of one of which we represent herewith, appear to be those of *Carya sulcata*.—EDS.)

Salix.—In a swamp willow found on the 4th of April, 1880, many of the catkins bore both fertile and infertile flowers. The catkins towards the top of the shrub—which was about 7 ft. high—as well as those along the ends of the lower branches, were normally staminate, those about the bases of the lower branches producing pistillate flowers. These appeared first at the base of the staminate catkin, varying from a few in this condition, to a fertile catkin bearing a few staminate flowers at its apex. Most of the ovaries were variously bent and distorted, and, being borne on what were originally the filament of stamens, were disproportionately long-pedicelled. Each bract of the catkin produced two of these long-pedicelled ovaries, instead of one as normally. The pedicels were sparingly villous either at their base or throughout their entire length.

Between the perfect stamen and the developed ovary, every degree of transition was to be observed, the general course of the transformation seeming to be as follows :

The ordinary two-lobed stamen assumed an abruptly acute or mucronate apex, lengthening into a style, the end of which first becoming granulated, developed a capitate stigma. Some anthers remained almost unchanged otherwise, while this was taking place, the result being an anther provided with a style and stigma. During, or succeeding this change, the green connective of the dorsal surface of the anther begins to widen, separating and encroaching on the yellow lobes of the anther, and pushing them around to the ventral surface, which thus becomes concave. The style also bends over in this direction. The outer or convex side is now entirely green in color, the inner or concave face bearing the two-lobed divisions of the yellow anther. The outermost of these lobes on each side become gradually obliterated, assuming the green color till the yellow of the former anther persists only as two narrow lines separated by a shallowing fissure in the floor of the convexity. This also soon relinquishes its color and adopts the green. The convex sides now grow around and together from the style downward, until finally we have the complete shell of a pistil, silky hairy on its external surface, and developed as from an ovate leaf. Within the base of this incipient ovary, through the ventral suture, I noticed in several cases that a small gland had appeared, similar to the glands at the base of the flowers. I was unable to determine what this represented. No ovaries were found further developed than this point. The shrub was left for a week until some of the catkins should become mature, but on my next visit the monoecious catkins had all fallen away, the staminate ones alone remaining, and I was only able to secure two or three imperfect specimens on which the above remarks are based.

During the course of these transformations some curious abnormalities occurred; for instance, several of the developing ovaries were noticed spirally twisted upon themselves, and one had bent into a right angle, two narrow approximate lobes of the anther still persisting, extending like a brace across the angle of the geniculated ovary, and in this novel position were discharging pollen. Perhaps I should have stated that the willow (*Salix discolor*?) was grow-

ing on the border of a reedy marsh at the foot of a sandy railroad embankment, the filling in of which had somewhat altered the natural soil, perhaps causing the peculiar freak above described.

EUGENE P. BICKNELL.

Riverdale, N. Y. City, *April* 11, 1880.

Salix and Rubus.—I have just sent you, by mail, some specimens showing a curious case of metamorphosis in *Salix* (*S. cordata*, Muhl?). They were collected near Plainfield, during May, 1879. The change of stamens into pistils is not, I believe, very rare in this genus, but here we have pistils passing into stamens through various gradations. There seems in these specimens to be a tendency in the ovary to separate into as many parts as there are stigmas, namely, four, forming as many imperfect ovaries; or one or more of the parts changing into stamens more or less perfect. The stalk of the ovary will thus often bear four branches, some of these being stamens and others ovaries. The anthers are sometimes attached to the side of an imperfect ovary.

I have also sent you a specimen of *Rubus Canadensis?* L., collected in a sandy field at Plainfield, during May, 1879. The flower has a strong tendency to revert to a leafy branch. The sepals are perfect leaves, are cut-serrate and even-lobed, and the stamens have changed into petals more or less perfect. All the plants growing near this one were found to have the same habit.

FRANK TWEEDY.

Maple with triple samara.—One of the sugar-maples in Broadway, Saratoga, has three keys to the fruit, in a large proportion of the latter. These keys are regularly disposed at an angle of 120°, and are in all respects normal, save as to number. All those collected by me had two or three seed-vessels excavated by a squirrel, and it turned out that the uninjured key was empty. The ordinary 2-keyed fruit of this species usually has one of the seeds abortive, and the squirrel is aware of this fact, though some of the books seem to have forgotten it.

The triple fruit of this tree is instructive as pointing to *Staphylea* (the bladder-nut), the horse-chestnut, and other allied genera which have fruit mostly with three divisions (or 2 or 1 by suppression). A 3-celled ovary is characteristic of Sapindaceae, to which these plants are now referred, and thus the triple samara of the maple may be regarded as not a case of pure monstrosity, as much as a reversion to the ordinal type. If it be true, as I was informed, that another tree near Saratoga presents the same peculiarity, the case is all the more striking, as showing a tendency towards reversion.

G. M.

Samaras of Maple.—*Acer dasycarpum*, Ehr., has nearly always one of its seeds and keys abortive. From one to six of the fruits in each raceme of *Acer Pseudo-Platanus* will usually be found to consist of three (very rarely four) samaras. The fruits at the base of the raceme, as well as the terminal one are those that generally exhibit this peculiarity.

W. R. G.

§ 42 . **Note on Populus balsamifera,** L. var. **candicans,** Gray— At the roadside, about two miles north of the city of Newburgh, on the Hudson, there is a remarkable specimen of the "Balm of Gilead" tree, which from its size, and probably great age, is deserving of being put on record in a botanical journal, and the more so, from the fact that the aged giant has been giving evidence for the last few years that its days are nearly numbered. In regard to this interesting tree (from whence a small collection of houses in the vicinity has received the name of Balmville) Mr. Ruttenber, in his History of the Town of Newburgh, gives the following facts: "Mr. Gilbert Williams, now (1875) in his 80th year, and who became a resident in its vicinity in 1808, relates that when in Nova Scotia (where he resided for nine years prior to 1832) he became acquainted with a John Cosman, who was an apprentice to Wm. Bloomer before the Revolution, who stated that while he was an apprentice he had shod horses under it many a time, and that it was a large tree then. Mr. Williams measured the tree in 1832, and its circumference (two feet from the ground) was 15 feet 2 inches. He measured it again in 1868, and found it to be 19 feet 5 inches, showing its growth to have been 4 feet and 3 inches in thirty-six years. His own recollection of the tree, added to Cosman's, carries it back at least a hundred years." There are, as might be expected of so notable an object, several traditions as to the origin of this tree. One is that the slip from which it grew was brought from New Jersey by a family of early settlers. Mr. Isaac Demott, an aged gentleman, son of one of the first settlers of the locality, and who would be likely to know more about it than any one else, told Mr. Eager, the historian of Orange County, in 1846, that "the tree grew there naturally—that when it had grown large enough for a rail, he cut it down to use it for that purpose—that it sprouted from the root, and he let it grow."

The "Balm of Gilead" is said by Muhlenberg to grow in New York, but Dr. Torrey, in the Flora of the State, says: "I have not found it indigenous within our limits." W. R. G.

The typical form of *P. balsamifera* occurs on the right shore of the Sacondaga River at Hope Centre, Hamilton Co., N. Y. I saw no large trees there, but there are quite a number of small size in the vicinity of a cabin which has been long unoccupied. They seemed to me to have sprung up spontaneously, perhaps suckers from larger trees that had been cut down to make the clearing. W. H. L.

§ 43. **Botanical News.**— In Trimen's *Journal of Botany* for March, Mr. J. G. Baker begins a Synopsis which is designed to embrace descriptions of all the known species of *Isoetes*. In the continuation of his paper "On the Botany of the British Polar Expedition of 1875–6," Mr. Henry C. Hart notes the fact that some plants seem unable to flower in Discovery Bay. Thus *Epilobium latifolium* and *Polygonum viviparum* do not nearly arrive at perfection; *Arenaria Groenlandica*, *Arnica montana*, *Saxifraga rivularis*, and *Cardamine pratensis* make no effort to flower, while others, such as *Saxifraga cernua*, *S. nivalis*, *S. tricuspidata*, and *Festuca brevifolia* blos-

som only very sparingly. Again, the anthers of others, such as *Alopecurus alpinus*, and *Stellaria longipes* rarely open so as to shed their pollen, as they do abundantly in lower latitudes. These instances go to confirm the author's observation that Arctic plants are independent of reproduction by seed. Butterflies and other insects, whose office it is to fertilize flowers, occur here; but this duty is no longer performed by them, and they remain merely as the relic of a former more extensive Arctic fauna. The other papers in this number are "Notes on the Flora of Northamptonshire," by G. C. Druce, and "On the Distribution of Hypnum salebrosum in Britain," by E. M. Holmes.

Catalogue of the Pacific Coast Fungi, by H. W. Harkness, M. D., and J. P. Moore, A.M. This Catalogue, issued under the auspices of the California Academy of Science, is the first of the kind ever published on the Western Coast, and contains the names and stations of such fungi as have been thus far found and identified by the authors in a district embraced within quite extended limits—from Mt. Shasta on the North to Fort Yuma on the South, and from the seashore to the eastern limits of the Sierras. The authors say that "in the cave fungi, or fungi of our mines, comparatively little has been done. Want of literature on this subject has been a great hindrance to us in this work. The single cave fungus placed in the addenda is so striking that we have deemed it worthy of an insertion." The remarkable fungus here referred to, described by Mr. Moore under the name of *Agaricus tridens*, was found in a Nevada mine at a depth of 400 feet below the surface. The stem was 3 ft. and 4 inches long, and hung suspended from a piece of timber, to which it was attached by a disk several inches in diameter. At 9 inches from the point of attachment the stem divided into three branches, which again united at just 9 inches from the point of division, and immediately sent off two lateral branches. The main stem continued downward, enlarging to the diameter of nearly 3 inches. At the point of attachment of the cap or pileus short branches, resembling the young antlers of a stag, projected. Two of them, more vigorous than the rest, extended downward, the larger of the two dividing into three branches, thus terminating the whole in a perfect trident. This is one of those curious monstrosities of some fungus which are very apt to occur in such situations as the one described, and which have often been noticed in Europe. Certain conditions of heat and moisture, combined with the absence of light, seem to conspire to cause an exuberance of growth of the hymenophore and its support at the expense of the hymenium and its fruit. Were the specimen under consideration a normal one, its decurrent, notched gills, its coriaceous texture, and its woody habitat would undoubtedly place it, not in the genus *Agaricus*, but in *Lentinus*. The majority of the fungi embraced in the list belong to the same genera and species as those found in other portions of the United States; although, as might have been expected, a large number of new species have been detected. The most remarkable discoveries, it seems to us, are those found recorded in the order Trichogastres, where we notice the names of *Podaxon Loandensis*, *Lycoperdon asperrimum*, *L. bicolor*, *L. caespitosum*, and *L. radicatum*, all

of which were originally described by Wellwitsch and Currey (Linn. Trans. xxvi) from the southwest coast of Africa. As a whole, the catalogue before us represents the results of a vast deal of labor on the part of the authors. We trust that they will continue the work they have begun until they have made known to us the entire mycological flora of the western coast of the United States.

Prof. Lawson Tait, who has been making extensive researches on the structure of "Pitcher Plants," (including under this name *Sarracenia* and *Darlingtonia*) is writing an instructive series of articles on the subject for the *Midland Naturalist*, one of which occurs in the March number, just received.

Nature, March 11th, prints an abstract of a paper read by Dr. Siemens before the Royal Society, March 4th, on the influence produced by the electric light on vegetation. Dr. Siemen's experiments thus far are but preliminary to other and more precise ones that are soon to be undertaken, but their general result has shown that plants exposed to the sunlight only, or to the electric light only, thrive about equally; while those exposed to sunlight first, and then to the electric light after sunset, surpass in vigor and rapidity of growth those submitted to solar light alone. These experiments are not only instructive in proving the sufficiency of electric light alone to produce chlorophyll in the leaves of plants, and in promoting growth, but they also go to prove the important fact that nightly repose is not absolutely necessary for the life of plants. It may, however, be argued from analogy, that such repose is not necessary, seeing that annual crops grow and ripen, and plants develop rich colors and aromas in a wonderfully short space of time in the northern regions of Sweden, Norway, and Finland, where the summer does not exceed two months, during which period the sun scarcely sets.

Science Gossip for March contains an article by J. Saunders, "On Alternate Dehiscence of Anthers." In his work on "Insects and Flowers," Sir J. Lubbock states that the five "polliniferous anthers of *Parnassia*," ripen not simultaneously but successively, and as each ripens it places itself right on top of the stigma, with its back to it, and the pollen is then discharged from the anthers on the side away from the stigma, so that it is scarcely possible for any to fall on it, and this is done by the five stamens in succession." Mr. Saunders, after careful observations made on upwards of two hundred blossoms, arrives at the conclusion that a portion of this description is scarcely correct. His own account of the phenomenon is as follows: When the corolla expands, the stamens are recumbent on the ovary and closely applied to it, forming a compact whorl on the top of the stigma. First one of these anthers is slightly elevated, and as the dehisence continues it is carried forward, describing an arc in its course, till the filament lies extended between the petals. The empty anther is suspended over the edge of the sepal, to which the stamen is opposite, and soon falls off. These movements are repeated by the stamens invariably in an inverse order, which may be expressed thus $\frac{3}{5}\frac{1}{2}\frac{2}{4}$, and never in such a succession as would be represented by $\frac{2}{3}\frac{1}{5}\frac{5}{4}$. Subsequent observations showed that this alternate

ripening of anthers occurs also in *Menyanthes trifoliata*. In many instances, in plants whose stamens are bicyclic, and thus double the number of petals, the dehiscence of the outer whorl, or those opposite the sepals, occurs first, and afterwards of the inner cycle or those opposite the petals. In these instances the alternation is between the cycles of the stamens, and agrees with the sequence of their development. Examples of this are furnished by several species of *Stellaria, Saxifraga, Epilobium, and Lilium*. The other botanical articles in this number are "The Rose of Jericho," (*Saulcya*, not *Anastatica*,) by T. E. Amyot, "List of Local Floras of Britain," by B. Hobson, and "Plant Rambles in Wales," by G. C. Druce.

Grevillea for March, contains articles by the Editor, Mr. M. C. Cooke, on the Fungi of the Libert Herbarium, "On the sub-genus Coniophora," on "The Fungi of India," and on "Some New York Fungi,"—the latter including descriptions of several new species belonging to our City's flora. The other articles are by F. Kitton on "The Diatomaceae of Kerguelen's Land;" by Phillips and Plowright on "New and Rare British Fungi;" by the Rev. J. M. Crombie on "New British Lichens;" and by Dr. Quelet on "Some New Fungi from the Jura and Vosges."

In the *Botanical Gazette* for March, Dr. Gray writes on "The Genus Leavenworthia," and calls attention to the "Automatic Movement of the Frond of Asplenium Trichomanes;" Dr. Rothrock tells "How to make Permanent Botanical Objects for the Microscope;" Mr. C. H. Peck describes a number of "New Species of Fungi;" and Mr. G. E. Davenport contributes a note on "Pteris aquilina." Last, but not least, the Editor speaks in complimentary terms of the BULLETIN, for which we thank him.

The *Quarterly Journal of Microscopical Science* prints an article on the Pollen-bodies of the Angiosperms by F. Elfving, translated and condensed from the "Jenaische Zeitschrift." A much shorter abstract of this paper was given by Dr. E. P. Wright in "Nature" last summer, and may be still further condensed as follows: It is asserted in the more recent manuals of botany that Gymnosperms and Angiosperms are differentiated, one from the other, by certain striking peculiarities relating to their reproductive systems; one of these being that in the former the pollen-grains are multicellular, and that in the latter they are unicellular. This distinction now turns out to be untrue. Fred. Elfving, of Helsingfors, working in the physiological loboratory of Strasburger at Jena, has proved that the pollen-cell of wind-fertilized or self-fertilized Angiosperms is also compound; or, in other words, that each pollen-grain becomes divided into two cells, one of which plays the part of a vegetative cell merely, and the other one takes upon itself the growth and functions of the pollen tube. Of these cells, the "vegetative" one is the smaller, and by a further division becomes developed into a two—or often a three—celled thallome. The vegetative cell, or cells, are only separated from the larger cell by a wall of cortical plasm, which, in particular instances, can become formed into a firmer membrane. Elfving does not seem to have studied the pollen of cleistogamous flowers, which, as suggested by Dr. Wright, might reveal some interesting facts.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII.] New York, June, 1880. **[No. 6.**

§ 44. **Proceedings of the Torrey Club.**—The regular monthly meeting of the Club was held at the Herbarium, Columbia College, Tuesday evening, June 8th, the Vice-President in the chair. Twenty-five members and eight visitors were present.

Mr. Britton read a report in regard to the field meetings that had occurred up to date.

A communication, accompanied by specimens, from Capt. J. Donnell Smith, was read by Mr. Leggett. The specimens sent were those of a fern which had been determined by Prof. Eaton as *Aspidium conterminum* var. *strigosum* (new to the United States), and of *Wollfiella gladiata*, var. *Floridana*, described below.

Mr. LeRoy, in behalf of the donor, Miss Mary C. Reynolds, of St. Augustine, Fla., presented the Club with a specimen of *Acrostichum aureum*, L.

On motion, the Secretary was directed to tender the thanks of the Club to the donors of the specimens.

Mr. Jos. Schrenk called attention to a remarkable specimen of a sassafras tree which he had recently observed on Jackson Avenue, near Newton, Long Island, the trunk of which measured 8 ft. and 6 inches in circumference. Dr. Newberry remarked that in the West, where the tree was abundant, he had seen specimens that were 2 ft. in diameter, and that these were considered of extraordinary size, but he had never met with any so large as the one mentioned by Mr. Schrenk.

A letter from Mr. J. H. Gore asking information in regard to "Tuckahoe" was referred to Mr. Gerard to report upon.

Prof. Wood exhibited specimens and read a list of twenty-five Idaho plants received by him from Lieut. Wilcox, two of which he thought were new species. Among the specimens was a species of *Peucedanum*, which Dr. Newberry stated formed an important element of food for the Indians of Idaho and Oregon. From the root, which is the part used, the epidermis is stripped off, and the internal portion is pounded fine and made into bread or pressed into flat cakes.

Mr. Brown presented to the Club's Herbarium specimens of three grasses found in New York City and new to its flora—*Festuca Myurus*, L., *Glyceria procumbens*, and *Phleum arenarium*, L.

An invitation was read from the North Jersey Botanical Club to join its members in a botanical excursion to Millburn, N. J., on Saturday, June 12th.

On motion the invitation was accepted.

Mr. Wolfe, the Secretary of N. J. B. C., being present, made, on invitation, a few remarks on the character of the flora of the locality to be visited.

Mr. Jos. Schrenk read a note on the parasitism of *Aphyllon uniflorum*, T. & G. This communication gave rise to considerable discussion in regard to other parasitic plants, such as *Monotropa* and *Epiphegus*.

Mr. Brown stated that he had recently detected a foreign species of *Orobanche* on the ballast heaps at Hunter's Point, which was growing at some distance from any other plants and did not appear to be parasitic, but that the matter needed further and closer investigation than he had given it. After a lengthy discussion of *Monotropa uniflora*, L., which was taken part in by Dr. Newberry, and Messrs. Wright, Britton, Leggett and others, Mr. Braman promised to study the plant's mode of life during the present season, and report thereon.

Mr. Britton read a paper on the "Northward Extension of the New Jersey Pine Barrens Flora on Long and Staten Islands."

Two names were proposed for active membership.

On motion the Club adjourned to meet during the months of July and August on call of the Secretary, and at such places as he may select.

§ 45. **New or Little-known Ferns of the United States. No. 8.**

24. **Aspidium conterminum**, Willd., var. **strigosum.**—This is the name which seems proper to be borne by a fern discovered by Capt. J. Donnell Smith, last March, in a miry swamp which drains into Peace Creek, Polk Co., Florida. The fern is related to *A. Noveboracense* and more closely to *A. Nevadense*, and belongs to a group of forms referred to *A. conterminum* in *Synopsis Filicum*, but divided into several species by Fée, Fournier, and other writers. The form found in Florida agrees perfectly with an authentic specimen of *A. strigosum*, collected in Guadaloupe by L' Herminier, and described by Fée in his Histoire des Fougères et des Lycopodiacées des Antilles, p. 78. t. XXII, fig. 2. It is also identical with *A. exsudans*, var. *majus*, of Fournier (Pl. Mex., Crypt. p. 93), as shown by a comparison of authentic specimens. From the more strictly limited *A. conterminum* it differs by the shorter stalk, and the more rigid frond, the under surface of which is copiously dotted with resinous globules, and by the presence of minute mamillate glands on the sides of the rachis at the insertion of each pinna. The character written for the Appendix of the "Ferns of North America" reads thus: "Root-stock stout, erect, often rising above ground, bearing a crown of fronds; fronds 1 to 4 feet long, puberulent and glandular beneath, very short-stalked, lanceolate, caudate-acuminate, much narrowed at the base, somewhat rigid, pinnate; pinnae sessile, narrowly lanceolate from a broader base, acuminate, deeply pinnatifid into oblong obliquely sub-falcate obtuse segments; veins free, simple; sori near the margin; indusium reniform, minute, glandular and somewhat pilose, evanescent."

A peculiarity, pointed out to me by Capt. Smith, is that the base of the stipe, for a little distance, is narrowly wing-margined on both sides by a protrusion of the parenchyma through the outer sclerenchymatous sheath. This is seen best by cutting a thin cross-section

of a stalk which has been soaked a long time in warm water. The rhizome is mostly erect, often standing nearly a foot out of ground, and with its circle of spreading fronds gives the plant the aspect of a miniature tree-fern.

25. **Notholaena nivea,** Desvaux.—Root-stock short, chaffy with narrow scales; stalks clustered, wiry, black and polished; fronds 3 to 6 inches long, pyramidal-ovate, tripinnate; primary pinnae mostly opposite, the rachises nearly straight; pinnules 2 to 3 times as long, ovate or oval, obtuse, entire or more or less lobed, smooth and green above, beneath densely white-pulveraceous, sporangia brown, often descending the free veins more than half-way to the midvein.

Arizona, the particular station not given; Mr. J. G. Lemmon, collected very recently. This fern is so closely related to *N. Fendleri* and *N. dealbata*, that the three might almost be considered forms of one species. *N. nivea* has narrower fronds than *N. Fendleri*, its rachis is straight, the principal pinnae are opposite, and the frond is less compound, and has larger pinnules. *N. dealbata* is a smaller plant, the fronds more compound and the pinnules much smaller. *N. nivea* occurs commonly in Mexico, and its range extends southwards to Peru.

26. **Notholaena Lemmoni,** *sp. nov.*—Root-stock short, scaly with narrow pointed rigid dark-brown chaff; stalks dark reddish-brown, wiry, 4 to 6 inches long, chaffy at the base with scales a little wider and more scarious-margined than those of the root-stock, otherwise smooth; fronds 6 to 9 inches long, 1 to 1½ inches wide, linear-oblong, pinnate with numerous deltoid or ovate once or twice pinnatifid pinnae, the lowest ones a little shorter than the middle ones; upper surface herbaceous-green, smooth; lower surface covered with white or slightly yellowish ceraceous powder; sori forming a narrow sub-marginal line; margins of the segments very slightly recurved.

Found in the clefts of granite rocks, on the southern side of the Santa Catarina Mountains, near Fort Lowell, and the town of Tucson, Arizona, by Mr. J. G. Lemmon (now residing at Oakland, California) in the Spring of 1880.

This fern evidently belongs to the same group of *Notholaena* (§ *Cincinnalis*) as *N. candida*, but differs from that species essentially in the long and narrow fronds, having also the lowest pair of pinnae smaller than the others near it, instead of being much the largest of any. From *N. Grayi*, its larger size, and the total absence of chaff from the frond will easily distinguish it. Mr. Lemmon is the discoverer of several of our rarer Californian ferns, and it is with real pleasure that I am able at last to name a fern of his own discovery in his honor. His Arizona collection, not yet distributed, contains many other rare ferns of interest, such as *Notholaena candida*, *Hookeri*, *dealbata*, *Parryi*, *sinuata* and *ferruginea*, *Cheilanthes myriophylla*, *Fendleri*, *Lindheimeri*, *Wrightii*, *Eatoni*, *Gymnogramme hispida*, *Pellaea Wrightiana*, etc., etc.

27. **Phegopteris calcarea,** Fée.—This European fern, though often attributed to North America, has only very recently proved its right to a place among our ferns. It was collected a few years ago by Miss Ellen W. Cathcart on slaty rocks, on the bank of the

St. Louis River in Eastern Minnesota. From our common *P. Dryopteris* it differs in having a glandular stalk and fronds, the latter more erect and rigid, and having smaller pinnae on the lower side of its primary divisions. An account of it will be found on page 277 of the "Additions and Corrections" of the "Ferns of North America"—*Aspidium conterminum* and *Notholaena Grayi* were received just in time to be mentioned in that work, but *N. nivea*, and *N. Lemmoni* have only come to hand when the last pages of the book are already printed. D. C. EATON.

New Haven, *June* 21, 1880.

§ 46. **Wolffia (Wolffiella) gladiata**, Hegelm, (*die Lemnaceen, eine monographische Untersuchung*, 1868, p. 133, Taf. III, fig. 24) var. **Floridana.**—Frons lineari-falcata, in apicem flagelliformem attenuata, 15–20-plo longior quam latior, margine subintegra, per omnes partes fere ad apicem cavernosa, totâ superficie cellulis pigmentosis ochraceo-punctata.

Hab. Gainesville, Fla., Nov., 1877, H. W. Ravenel; (specimens in Herb. Harvard University from Dr. Geo. Engelmann under the name of *W. gladiata*, Hegelm.)—Great Gulf Hammock, Levy Co., Fla., growing in extensive and thick mats on or near the surface of stagnant water with *Lemna minor*, L., March, 1878, C. F. Austin and J. D. S.—Exsiccated swampy ground, Sumter Co., Fla., adhering to *Riccia natans*, L., var. *terrestris*, March, 1879, J. D. S.—Borders, exposed by the subsiding water, of a pool near Ocala, Fla., with *Wolffia Columbiana*, Karsten, *Lemna polyrrhiza*, L., *L. minor*, L., and *Amblystegium riparium*, Br. & Sch,, April, 1879, J. D. S.—Very abundant over marshes of *Typha latifolia*, L., four miles east from Cedar Keys, Fla., March, 1880, J. D. S.

Matured fronds are 3″ to 4″ long, diminishing in breadth from 0.2″ near the base to 0.04″ at the apex. The base is arcuately truncate with the stipitate angle hastate. The stipe is articulated, sub-persistent, and 0.35″ long. The pouch (*fovea*, *Taschengrube*) is elongated, acuminate, 0.6″ long, and at its mouth 0.3″ broad. The apical portion only of the frond ($\frac{1}{8}$ – $\frac{1}{10}$ of its length) is destitute of air-cavities. Usually 2, and sometimes 3 to 6, vegetative generations cohere. It is readily distinguishable from any described Cis-Mexican form of *Wolffia* by its elongation, but better by the character of the sub-genus, viz: "**Wolffiella.** Frons pone marginem lateralem foveae basilaris proliferae frondi maternae affixa, directione horizontali symmetrica. Plantae tantum steriles notae." (Hegelm. Lemnaceae in Martius' Flora Brasiliensis, fasc. LXXVI, 1878).

In the plant from Mexico, described as *W. gladiata*, the air-cavities do not extend to the anterior $\frac{1}{4}$—$\frac{1}{3}$ part of the frond, or to the portion forming the pouch; the sabre-shaped frond is one-half shorter in proportion to its breadth, and with a 4 to 5 times broader rounded apex.

Dr. Hegelmaier writes as follows in regard to specimens of this plant submitted to him for examination under the name of *W. Floridana*, n. sp.:

"The plants from all four stations belong strictly to the same

form, and that is nearly related with the one from Mexico, described as *W. gladiata*. As is correctly observed in your description, the Florida is distinguished from the Mexican plant by the much ($1\frac{1}{2}$–2 times) greater elongation of the fronds. The apical portion especially is considerably narrower in proportion ; and, although there is always a part of that portion destitute of air-cavities, yet that part is relatively shorter. Moreover, the sabre-like curvature of the fronds is often more decided. The last two characters are directly associated with the more elongated forms. I have some doubts, however, whether it is advisable to distinguish *W. Floridana* as a species. From my observations of other *Lemnaceae* I should hardly venture to found a separate species upon the above differences. At any rate, however, we have here a beautiful and interesting form, the discovery of which in such quantities in Florida constitutes an important contribution to the Flora of the United States. Had both forms come to my knowledge at the same time, I should probably have taken the Florida plant for the type of the species, inasmuch as it is constant with itself wherever you have found it ; and the Mexican plant would have been treated as a *var. abbreviata*. The Cedar Keys specimens are the best adapted for study of structure, as they abound in starch, and after colorization by chloride of zinc the extent to which air-cavities prevail becomes plain."

The sub-genus *Wolffiella* comprises three other species. These differ from *W. gladiata* only in subordinate characters. *W. denticulata*, Heglm., from South Africa, has air-cavities embracing the whole frond and the pouch, but pigment-cells are not present at the anterior end, and the apex of the linear frond is truncate and denticulate. In *W. oblonga*, Philippi, from Chili, and in *W. lingulata*, Hegelm., from Mexico, Brazil and India, pigment-cells pervade the whole plant, air-cavities embracing in the former species every part except the pouch, and in the latter species only a small part of the posterior end of the frond ; the outlines of each are as indicated by their names. I am indebted to Messrs. Sereno Watson and Charles F. Parker for the opportunity to examine typical specimens of *W. gladiata* and *W. lingulata*.

But Dr. Hegelmaier has remarked upon two singular deviations, which all of these plants exhibit from the type of *Wolffia*, and which have led him to conjecture that *Wolffiella* will constitute a distinct genus when its reproductive organs shall come to be known.

1st. The insertion of the stipe at the basal angle, and the position of the costa along the lateral margin of the pouch, cause the frond to be *transverse*, instead of *median* zygomorphous.

2d. The stipe and costa of the cohering young frond occupy the opposite side of the pouch to those organs in the parent frond. Hence, if we detach the two fronds from each other, and bring them into superposition without changing their exposed surfaces, they will be found to have stipe and costa similarly right and left, and their agreement to be absolute, and not relative as in a pair of opposite leaves. This anomaly has been found difficult to interpret morphologically in the absence of any knowledge of the inflorescence of these plants.

JOHN DONNELL SMITH.

Baltimore, *May 27th.*

§ 47. **Bees and Flowers.**—I find that the behaviour of bees is governed by circumstances. When flowers are abundant they visit those only which they prefer, at other times they examine any thing which comes in their way. I have seen honey bees attack the vineyard ; though, as a general thing, it would be safe to say they would not eat grapes.

At the time I am writing, May 18th, there is a dearth of garden flowers. Those of the early spring are gone, and the later ones are not well forward. But *Aquilegiae* in many species are in bloom. The humble-bee bores the ends of the nectaries, and sucks the honey stored there ; and the honey-bee follows and sucks from the same hole what may be left, or what may be afterwards generated from the honey gland. I have often watched closely to learn whether the honey-bee bored for honey. Its quick motions are unfavorable to correct observation. I thought once I had caught it boring lilac flowers, but I afterwards counted all the flowers that had been bored by the humble bee, and then watched the work of the honey bee on the cluster, and there were no more bored afterwards than before. The *Aquilegiae* with curved nectaries, such as *A. vulgaris* and *A. Olympica* are very favorable for observation, as the slit is made on the upper side of the curve, and the honey-bee can be easily seen following after the crumbs that have been left on the strong one's table. I have no doubt, however, it would bore for itself if it had the power, and it perhaps sometimes does. The humble-bee and the honey-bee are evidently not the insects for which the *Aquilegia* had this beautifully contrived nectar cup provided to induce cross-fertilization, and what particular insect was designed to be the favored one, so that it and no other could turn its tongue around these twisted spurs to get at the honey in the end, I think no student has discovered.

THOMAS MEEHAN.

§ 48. **Notes on the behavior of Fig trees after an unusually severe winter in Syria.**—The last winter was one of rare severity in Syria. Ice formed a quarter of an inch thick in Beirut. Snow fell to the depth of several inches. Such phenomena had not occurred for twenty years. As a result of this extraordinary cold, many fig trees in the mountains died and the growth of the fig orchards of the plain was seriously checked.

The fig tree usually puts forth its bud, which is an inverted torus lined with apetalous flowers, at the time of the first appearance of the young leaves. In fact, the fruit bud is a little in advance of the young leaves. It was this circumstance which caused the curse on the barren fig tree, which had leaves but no figs. A fig tree with leaves ought *a fortiori* to have figs. But this year the cold winds and frost checked and destroyed the fruit buds which ought to have appeared early in March. On a tree in my garden which usually produces hundreds there were about a dozen. The leaves, however, unfolded somewhat later than usual, and the scattered early figs which had escaped the frost developed with them. A month later than the complete growth of the leaves, and after the early figs had attained the size of a hickory nut, the branches were covered with a

profusion of fruit buds, even more than usual, owing no doubt to the depth to which the soil had become saturated by the unusually heavy rains of winter. We have, therefore, the phenomena of two crops of figs on the same tree, an early and a later, developed at the same time. I may remark that this is not a habit of the fig, as it is of some of the berries in temperate climates, which develop a series of buds and mature a succession of fruits through a considerable period of time. GEORGE E. POST, M.D.

Beirut, *May* 26, 1880.

§ 49. **Aphyllon uniflorum,** T. & G.—My own observations during a number of years, and those of several members of the Club during the present season, seem to prove that, in our district, this parasitic plant grows on the roots of *Solidago*, only. It might not be out of place to request botanists of other sections to have an eye on the plant, in order to settle this question.

A close examination of the points of attachment shows that the suction-organs of *Aphyllon* (very small protuberances along the roots, or what corresponds to roots) consist entirely of parenchymatic tissue; its cells are large and roundish, only those cells that penetrate into the tissue of the foster plant are considerably elongated.

Comandra umbellata, Nutt., I found on blueberries; but as I ascertained this in a few instances only, I will not draw any conclusions. I just mention this plant to state that its suction organs differ widely from those of *Aphyllon*, by having well developed fibro-vascular bundles, the first ducts of which originate quite close to the tip of the organ. This difference, of course, will find its explanation in the different mode of assimilation that goes on in the two plants—the one being a true parasite, while the other has green foliage.

College Point, *June* 7, 1880. JOS. SCHRENK.

§ 50. **Sassafras officinale,** Nees.—I noticed an unusually large sassafras tree standing on a farm near Newton, L. I., its circumference about 1½ or 2 feet from the ground is 8 feet 6 inches. Two inches or so ought, perhaps, to be deducted, for several stems of *Ampelopsis* and *Rhus* climb up the trunk, which is well-formed and of nearly uniform thickness up to the lowest branches, at least 8 feet above the ground. The tree, in reference to height, presents the appearance of a large-sized stately oak; and, when covered all over with its shining yellow blossoms as it first caught my eye, is well worth seeing.

College Point, *June* 15. JOS. SCHRENK.

§ 51. **Teratological Notes.**—Prolification of the inflorescence in various species of *Plantago* seems to be of common occurrence in Europe and curious forms of it are occasionally noted in English periodicals. Dr. Masters, in his Vegetable Teratology, figures some of these and states that each species of this genus seems to have its own perverse mode of growth. Changes of this nature in our native and introduced species of plantains may be common, but accounts of them do not often find their way into print. A friend has specimens of *P. Rugelii* from Bloomfield, N. J., in which the upper part of the

spike is branched and some of these branches have secondary branches. The same collector has from Carlstadt, N. J., *Typha latifolia*, in which there are several small spikes arising side by side from the top of the culm, and which appear to be due to fission. During the field meeting of the Club at New Dorp a few weeks ago a large number of specimens of *Plantago lanceolata*, L., were observed, in each of which there were from four to five long, thick sessile spikes terminatiug the scape. Mr. N. L. Britton detected a specimen of this species of plantain near New Dorp, the single spike of which was subtended by a whorl of leafy bracts. On the same excursion there was found in the woods, between New Dorp and Garretsons, a double-flowered specimen of *Rubus cuneifolius*.

Dr. Gray's note in the *Botanical Gazette* on a three-flowered bloodroot reminds me that a few years ago I found a specimen of dandelion with two well-developed capitula at the apex of the same scape. The scape in this instance was perfectly terete and smooth, and exhibited none of those striae which usually accompany cases of fasciation. The specimen is now in the State herbarium.

Fasciation in the peduncle of *Sophora*, as in the example shown by me at a recent meeting ot the Club, is not (as I am informed by the gentleman who sent the specimen from Texas) uncommon in this plant especially where the tree is in cultivation. It would be interesting to know whether the buds with which the flattened and striated peduncle is profusely covered produce deformed flowers. On several occasions, and in different localities, I have observed an example of fasciation in *Erigeron Canadense*, L., the stem of which was completely flattened and expanded to a width of three quarters of an inch, and terminated abruptly in a dense mass of leaves. This kind of deformity, which occurs so frequently in some plants (as in the cock's-comb for example) that it may be said to almost constitute their natural state, is brought about, according to the views of Dr. Masters and others, by the adhesion of buds that have been produced in some numbers and in close proximity, through superabundant nourishment—especially if this be accompanied by some check or injury.

Many interesting specimens illustrating the subject of Teratology, and many observations in regard thereto, have been brought to the attention of the Club from time to time, but unfortunately no account of them has ever been published. At the December, 1878, meeting Dr. Gross exhibited a case of median floral prolification in a rose, the prolonged axis of which bore a second full-blown flower. In a note to the *Scientific American*, Prof. F. L. Harvey, of Fayetteville, Ark., reports an instance of this nature in which, of two proliferous roses on the same bush, the axis of one bore five perfect flower buds, and that of the other, two. "Proliferous roses," says Dr. Masters, "have a special interest, inasmuch as they show very conclusively that the so-called calyx-tube of these plants is merely a concave and inverted thalamus, which, in prolified specimens, becomes elongated. Occasionally from the middle of the outer surface of the urn-shaped thalamus proceeds a perfect leaf, which could hardly be produced from the united sepals or calyx-tube."

I have specimens of *Centaurea Cyanus*, L., which I obtained from a garden a few years since, and which exhibit this same sort of prolification—the elongated axis bearing a second capitulum very slightly smaller than the primary one. At the same meeting of the Club, Dr. Thurber, after remarking that double flowers are rare in a state of nature, announced that he had recently received from Connecticut, specimens of *Nesaea verticillata*, H. B K., in which all of the flowers were double; and another member reported that he had observed, during the preceding spring, the same thing in a specimen of *Saxifraga Virginiensis*, Mchx. In the note before alluded to, Prof. Harvey states that he had seen a plant of some species of *Allium* in which a stamen, in a flower otherwise normal, was replaced by a bulblet; and in another flower, one of the stamens was replaced by a perfect flower. He says further: "An ear of corn, which has grown wrong side out, is in my possession. The ear has the form of an inverted truncated cone, bearing the kernels on the walls of the hollow. The cob has a smooth exposed surface, and a texture somewhat more compact than that of the cob of normal ears." This is perhaps a case of eversion of the axis, the termination of the latter becoming hollow through a disproportionate growth of the outer as contrasted with the central parts of the rhachis, and the female flowers and the seeds being borne on the walls of the tube thus formed.

W. R. G.

§ 52. **Publications.**—1. *Preliminary List of the Plants growing without cultivation in Alabama*, from the collections made by Eugene A. Smith, Tuscaloosa, and Charles Mohr, Mobile, compiled by Charles Mohr; 629 genera, ending with *Azolla Caroliniana*, Willd.; containing about 1,600 species and varieties, of which something like half are strangers to our region. We notice that Mr. Smith is the authority for *Asplenium ebenoides;* it would be interesting to know whether he found it in the locality discovered by Miss Tutweiler, or has a new station for this disputed species. This list is preliminary to a complete catalogue of the Flora of Alabama to be published hereafter in one of the Reports of the Geological Survey of the State. Those who have authentic specimens of plants not in the list are invited to communicate them to Messrs. Smith and Mohr.

2. *Forest Trees of North America.*—It is proposed to join to the Report on the Forest Wealth of the United States now in preparation for the Tenth Census, a Catalogue of the Forest Trees of North America, with special reference to their geographical distribution and economic properties and uses. To facilitate the collection and preservation of such information Prof. Chas. S. Sargent, Brookline, Mass., issues this preliminary catalogue, with blank pages for field notes and corrections. Any information which will serve to make the final publication more exact and complete will be gratefully received and duly acknowledged. Almost every botanist has it in his power to contribute something. Information on the following points is particularly needed.

1. The extreme geographical range of any species.
2. The region and elevation where any species is principally multiplied and reaches its greatest perfection.

3. The geological formation most favorable to the multiplication and development of any species.
4. Dimensions of remarkably developed specimens of any species.
5. The common or local name of any species in addition to those already given.
6. The purposes, however unimportant, for which the wood of any species is employed.
7. Products of any species other than wood, such as tannin, charcoal, dyes, potash, edible fruit, forage, etc.

3. *Catalogue of Trees and Shrubs, native and introduced, in the Horticultural Gardens adjacent to Horticultural Hall in Fairmount Park, Philadelphia.*—The purpose of this catalogue seems to be in part to furnish the visitors to the Park with some means of determining the names of the trees and shrubs which attract their observation. In consequence the arrangement is not strictly scientific, and the names are frequently those popular with gardeners in preference to the less known botanical denominations. The need of some guide to the name and character of the plants cultivated in places of public resort is obvious, if any educational purpose is to be served by such collections. But the plants should be conspicuously labelled, for the ordinary visitor has but slender opportunity to determine the botanical position of a tree or shrub whose acquaintance he desires to make. The CLUB made some effort to have this labelling done for Central Park, but without pushing the matter through. This catalogue will no doubt prove a great boon to those of the Philadelphia public who interest themselves in the vegetation of their noble park.

4. *The Bartram Oak*, by Isaac C. Martindale, read at the annual meeting of the West New Jersey Surveyors' Association, at Camden, 1st month 6th, 1880. In this interesting monograph of 24 pages Mr. Martindale has collected all the references to this much discussed oak. The typical specimen described by Michaux, found by him in a field belonging to Mr. Bartram, has long since been destroyed. The trees on the Bartram place which have been accredited as seedlings of the original, and have probably on this account contributed much to the doubts about its being a true species, are here supposed to be seedlings of *Quercus Phellos* and not of the original tree. Other specimens have been found growing wild up and down the Delaware, and, it is believed, in North Carolina and Texas. Mr. Martindale, upon a review of all the evidence and a personal knowledge of a number of the trees, is strongly of the opinion that *Quercus heterophylla*, Mchx., is a distinct species.

5. *Catalogue of North American Musci*, arranged by Eugene A. Rau and A. B. Hervey, A.M. This catalogue is designed to be a convenient check and exchange list and a basis for arrangement of genera, etc., in herbaria. The classification is mainly that adopted by Prof. Schimper in his Synopsis of European Mosses. All the authentic species and varieties reported from Mexico to the Arctic regions have been included, and their habitats given with as wide a range as the examination of references and several good herbaria would permit. The compilers acknowledge particular indebtedness to C. H. Peck, C. F. Austin and Chas. Mohr. It may

be obtained of Mr. Rau, Bethlehem, Pa., or Mr. Hervey, Taunton, Mass.

§ 53. **Botanical News** —*Annual growth of Trees.*—To the Journal of the Royal Society of New South Wales the Rev. G. E. Tenison-Woods contributes some interesting data in regard to the annual growth of trees. He states that a blue gum tree (*Eucalyptus globulus*), known to have been planted eighteen years previously, when cut down was found to have thirty-six concentric rings, *i. e.*, two for each year. As this tree, as well as *E. obliqua* and others, sheds its bark twice every year, he concludes that the sap rises twice a year in these trees.

Sizes of Leaves and Colors of Flowers.—According to the Gardeners' Chronicle, M. Ch. Flahault, in the *Annales des Sciences Naturelles*, brings forward additional observations to support his view that, under equal conditions, the leaves of plants of the same species are larger in proportion as we go northwards ; these relatively large dimensions being due to the duration of light of relatively feeble intensity. In cases where the chrophyll is formed in the absence of light it must be formed at the expense of the materials stored up in the tissues. The importance of these reservoirs of nutriment is still greater in the case of flowers. Thus, in the case of hyacinths, both blue and red, M. Flahault found no difference in the color of the flowers grown in the light or in the dark, the color being manufactured from the stores of materials in the bulbs.

Plant Hairs.—At a recent meeting of the Société Botanique de France, M. Poisson read a paper on "The Adaptive Character of Plant Hairs," and stated that in most climbing plants, as Darwin had shown with regard to the hop, *Galium aparine* and *Rubus australis*, the ridges alone of the stem are furnished with stiff hairs whose tips are bent downwards, while, in the intervals between the ridges, on the upper surface of the leaves, and on the inflorescence, etc., the hairs have a forward or horizontal direction. That these hairs are adapted to enable the plant to climb, is, he considers, evident from the fact that in the dwarf varieties of the haricot beans, which do not climb, these hairs have not a downward direction, and that in the *Loasaceae* and other families, it is the species which climb that alone present this form of hair. Of course, there are exceptions, such as *Dioscorea*, in which the leaves are glabrous, and the stem hairs not bent downward. M. Poisson proposes to turn to account the fact that, in the majority of cases, climbing or twining plants have recurved hairs, by using it as a means of judging from incomplete herbarium specimens whether the specimen is a climbing plant or not.

The April and May numbers of Trimen's *Journal of Botany* contain mostly continued articles ; the new papers are, in the April issue, "New Zealand Plants," by Dr. Berggren, and in the May, an article on "Some Dorset Plant-Stations," by the Rev. W. Moyle Rogers.

The *Botanical Gazette* for May contains notes on—"New Species of Potamogeton," by Thos. Morong; "Notulae Exiguae," by Dr.

Gray; "Vitality of Seeds of Pinus contorta," by C. S. Sargent; "A Nolina in Colorado," by E. L. Greene; "Early Plants," by F. L. Harvey; "Crataegus tomentosa var. punctata," by E. F. Smith; "Winter Herborizations on Indian River," by W. W. Calkins; Recent Publications.

The first number of Dr. Engler's new botanical journal the *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflangenzeographie*—has reached us, and contains articles by Oscar Heer, Alph. de Candolle, Eug. Warning, O. Beccari, and A. Engler, followed by a summary of the important works which appeared in 1879 on Systematic Botany, and on the history and distribution of plants. The novel feature has been introduced into this venture in botanical journalism of publishing communications in the language in which they were written.

Flora of the West Indies.—Baron Eggers, St. Thomas, West Indies, has undertaken to organize a complete exploration of the whole of these islands, especially of those less known. The imperfection of our knowledge of this Flora, and the importance of it in relation to that of North America are well known, and we wish Baron Eggers all success. We presume that the outcome will be a tolerably complete published account of the vegetation of these islands. Meanwhile Baron Eggers proposes to furnish subscribers with sets at very reasonable rates. Full information may be obtained of Baron Eggers, or Dr. Phil. Eug. Warning, Copenhagen, Denmark.

The American Monthly Microscopical Journal.—In the June number the Editor gives notice that he will begin work on the first part of Habirshaw's valuable Catalogue of the Diatomaceae at once, and that Part I. will probably be ready in July. This catalogue will be a complete index to all the published literature describing or figuring the Diatomaceae. The four parts are to be issued in rapid succession; and, as only a small number of extra copies will be printed, those who intend to subscribe should do so immediately.

From the June number of the lively *California Horticulturist* we learn that a new station for *Cheilanthes viscida*, Davenport, has been found at Aqua Caliente, in the same region as the original station, the Cañon of the White Water. This periodical pays a well deserved tribute to the late Charles C. Frost, the eminent cryptogamist of Brattleboro, Vermont.

§ 54. **Necrology.**—Charles C. Frost, one of the pioneers in the study of American Cryptogamous botany, and who was especially well known as a devoted student of the fungi, died at Brattleboro, Vermont, March 16th, in the seventy-fifth year of his age.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

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§ 55. **Proceedings of the Torrey Club.**—The regular meeting of the Club was held at the College of Pharmacy, Tuesday evening, July 13th, the Vice-President in the chair, and ten members and three visitors in attendance.

There were exhibited a large number of species of *Chenopodiaceae*, from Staten Island, by Mr. Wright; specimen of tetramerous *Iris versicolor*, L., from Long Island by Mr. Schrenk; and a number of specimens of three-winged fruit of *Negundo aceroides*, Moench., and *Acer Pseudo-Platanus*, L., from Central Park. Mr. Schrenk reported that he had detected *Danthonia sericea*, Nutt, at Little Neck, L. I.

Mr. Brown read a list of ballast plants that he had discovered this season in the vicinity of New York, one of which (*Roubieva multifida*, Moq.) he exhibited. The complete list will be published hereafter.

Mr. Bicknell stated that he had recently detected *Melanthium Virginicum*, L., just north of the City limits. Mr. O. R. Willis reported the interesting discovery by him of *Narthecium ossifragum*, Huds., var. *Americanum*, Gray, at several places within one and a half miles of the village of White Plains, Westchester County. This plant has hitherto been found in the pine barrens of New Jersey only.

The subject of parasitic plants was again discussed, and Mr. Schrenk exhibited a glass slide on which were mounted the root fibres of the different plants among which the roots of *Monotropa uniflora*, L., had been found nestling—although no connection had been observed between them, These fibres were covered with brown fungus hyphae which answered to the description, given by other investigators, of the "byssoid fungi" or fibrous processes that envelop the roots of the *Monotropa Hypopitys*, L., and appear to communicate with the plants near which the latter grows. Mr. James Ware, of Stapleton, S. I., was elected an active member. One name was proposed for corresponding membership.

§ 56. **Field Meetings of the Torrey Club.**—The first field meeting of the season was held at West New Brighton, S. I., and the swamps about Clove Lake. The persons who took part in the excursion were Misses Beckwith, Dubois and Brown, and Messrs. Gross, Wright, Schoeny, Wilber, Britton and Gerard. Before proceeding to the woods the party visited the greenhouses and gardens of a veteran member of the Club, Mr. Wm. Charlton, and were afterwards entertained at a bountiful collation prepared by his hospitable wife. No new stations were discovered for plants already reported. The plant recorded as *Viola delphinifolia*, Nutt., in the "Flora of Richmond County," was found in abundance, and, on examination, discovered to be one of the many forms of that protean species, *V. cucullata*, Ait. *Viola striata*, Ait., was found here in profusion.

On May 22d, the Club visited Williams' Bridge, and followed the course of the Bronx river southward. The persons present were Misses Dubois and Adam, and Messrs. Leggett, Britton, Wilber, Schoeny, Gross and Gerard. Here new stations were discovered for the following plants: *Staphylea trifolia*, L., *Allium tricoccum*, Ait., and *Galium Mollugo*, L., along R. R., south of depot; *Arisaema, Dracontium*, Schott, in a swamp near the Bronx river; and *Isoetes riparia*, Engelm., on the river shore about opposite Fordham station.

On May 29th, five members of the Club—Messrs. Rudkin, Bower, Britton, Schrenk and Schoeny—visited the pine barrens, and explored the region lying between New Egypt and Manchester, and afterwards proceeded to Tom's River. At New Egypt, *Viola tricolor*, L. var. *arvensis*, DC., was found in some abundance, and seemingly a native. *Anthemis arvensis*, L. was observed to be rapidly spreading and becoming very common in the "Pines."

On June 5th, the field meeting was held at New Dorp, S. I., Messrs. Rudkin, Bower, Britton and Gerard being present. No new plants nor no new stations were discovered on this excursion.

§ 57. The Geological History of the North American Flora,

by J. S. NEWBERRY.

[*Abstract of a lecture delivered before the Torrey Botanical Club.*]

America is called the New World, but, so far as we now know, that portion of North America which lies immediately north of the St. Lawrence and the Great Lakes, with its southern extension, the Adirondack region, is the oldest portion of the earth's surface. This land area, sometimes wider, sometimes narrower, and gradually increasing, has continued to exist throughout all recorded geological time; hence it is not surprising that we have here the most complete and connected history of plant life. A brief synopsis of this history I shall attempt to give you this evening.

Previous to the Cambrian and Silurian ages, and the beginning of the *legible* life-record of the globe, a broad continental area occupied what is now the eastern half of North America. Whether this land bore any terrestrial vegetation we do not yet know. The Archaean rocks which compose it contain quantities of carbonaceous matter, now graphite, undoubtedly derived from plant tissue; but whether the tissue of land plants or seaweeds we have no means of knowing, in consequence of the complete metamorphism of the strata.

In the Lower Silurian age this old continent sank, and the sea flowed in over a large part of its surface. The beach formed by this invading sea we now call the Potsdam sandstone. Later deposits, which are like this, the direct wash of the land, frequently contain the impressions of land plants in abundance. In the Potsdam sandstone we have found none, and therefore we may infer that, if not absent, they were few in this age. Marine plants however were abundant, and the layers of the Potsdam sandstone are in a thousand places covered thickly with a network of interlacing stems of seaweeds, or rather their casts, because the vegetable tissue has all disappeared.

The limestones of this age—the organic sediments spread by the Silurian ocean over all the area it submerged—contain also abund-

ant impressions of seaweeds, but no unequivocal traces of land vegetation. Some casts of plant stems found near Cincinnati have been described by Mr. Lesquereux as the remains of land plants, but in my judgment other proof of the existence of land vegetation in the Lower Silurian age must be furnished before we can make any positive assertion on the subject.

In the Upper Silurian age, narrower, but still extensive portions of our old continent suffered submergence, and in the deposits of this second sea we have indisputable evidence of the existence of land plants. These have been found in Michigan and Canada, and consist of the remains of ferns, lycopods, equiseta and conifers, but the specimens are small in size and comparatively few in number, and hence we may infer that land vegetation was not abundant. We are also warranted in the inference, since we have in this earliest known land flora the highest group of cryptogams—the acrogens, and the still higher gymnosperms—that this is not the real beginning of the land flora, and that something simpler and older existed and will probably be discovered. As before, there were seaweeds in great abundance in the Upper Silurian sea.

The subsidence which gave us the series of sediments we now call the Devonian system, was less extensive than those which took place before the area of permanent land was greater; and the proofs that this land was covered with a luxuriant, beautiful and varied terrestrial flora are conclusive. We have of course made but a beginning in the disinterment of the remains of this flora, but we have already learned enough of it to sketch in clear and strong lines its principal botanical features.

Dr. Dawson has described from the Devonian rocks of Canada and New York, more than a hundred species of Devonian fossil plants. These include conifers of several genera, ferns in considerable number, and not a few lycopods and equiseta. Within the United States the most interesting Devonian plants have been found in the Corniferous limestone of Ohio, and the Hamilton rocks of Gilboa, N. Y. In this age, a chain of islands ran down from Lake Erie to Tennessee, and, in the limestone which accumulated in the sea surrounding these islands, quite a large number of plant remains have been found. These seem to have been floated off from the Cincinnati island and water logged in the adjacent ocean. The trunks of tree-ferns representing three genera, with a number of smaller plants, have been already obtained from the insignificant excavations of the quarries at Delaware and Sandusky. At Gilboa we have the old shore upon which the plants grew, and here again we find tree ferns of several kinds, some of the trunks attaining a diameter of two feet, with *Nöggerathia*, supposed to be a cycad, *Lepidodendron*, a lycopod, and that singular *Psilophyton* of Dawson apparently connecting the lycopods and ferns, and widely diffused in the Devonian age.

The Carboniferous flora was but a continuation and expansion of the Devonian. It has been so fully revealed in our excavation of the coal beds, and has been so well studied, that all its general features have come to be familiar to every student of geology. No lengthy description of the coal flora, rich and interesting as it is, is therefore

required here. I will only say in passing that the Carboniferous flora of America exhibits the same botanical characters as that of the Old World. A few genera and a large number of species are peculiar to America, but in all the great collections of fossil plants gathered from the coal strata of this country, there is perhaps no botanical element which has not also been noticed in Europe. It is impossible now to say how many species of plants have been obtained from our American Carboniferous rocks, for the literature of the subject is cumbered with much synonymy, and species have been multiplied by describing under distinct names the stems, leaves, and fruit of the same plant; but at least five hundred distinct species have been described, and that number is being added to every year. Of those already known, probably half should be considered identical with some of those found in Europe; and in some strongly marked and well-known species the identity is so complete that we cannot but wonder at the potency of the vital influence which held so closely to an elaborate pattern, organic structures inhabiting different quarters of the globe.

The Triassic and Jurassic floras were essentially alike in botanical characters. They both show a complete and surprising revolution in the vegetation of the globe in the passage from the Palaeozoic to the Mesozoic ages. By influences of which up to the present time we are ignorant, the great acrogenous flora of the Devonian and Carboniferous—consisting of gigantic lycopods and equiseta, the peculiar group of sigillarids, a few simple-leaved cycads, and many ferns—passed away "like a tale that is told" and, instead, without known transitional forms, arose the great cycadaceous flora of the Mesozoic. Here the lycopods have shrunk to insignificance, the sigillarids are extinct, the calamites with their allies, *Annularia* and *Sphenophyllum* are replaced by true *Equiseta*, the conifers and cycads multiplied until they constitute the most conspicuous forms of vegetation. These conifers were Araucarians; some with close rhomboidal appressed disks for leaves (*Brachyphyllum*), others with divergent fleshy scales (*Albertia*) like the Brazilian Araucaria of the present day, and still others with filiform foliage like the modern spruces (*Voltzia*.) The cycads were almost infinitely varied. Some were arborescent, with lofty trunks crowned with graceful canopies of nodding plume-like fronds, while others grew in spheroidal masses marked with rhombic leaf scars, suggesting to the first discoverer gigantic birds' nests (*Mantellia nidiformis*). Remarkable changes are also noticeable in the ferns. Those with highly compound fronds (*Sphenopteris*, *Pecopteris*, etc.), which existed in such vast numbers in the Carboniferous age, were to a great degree superseded by those with simple linear or spatulate fronds (*Taeniopteris*), and by those in which the stipe bore a horizontally-expanded pedate or spiral frond (*Camptopteris*, etc.) or broad pinnate or radiate fronds, like *Clathropteris*, of which the surface was divided into rectangular areoles by the strong nervation. All these forms were as unlike as possible to the ferns of the Palaeozoic ages, and had little resemblance to any that are now living.

Abundant remains of the Triassic flora are found in the rocks of this age at Richmond, North Carolina, in New Jersey, and in the Connecticut Valley. In certain localities vegetation was so luxuriant

that it accumulated in the form of extensive and thick beds of peat, which are now coal. Associated with these coal beds near Richmond, and in the Deep and Dan River basins of North Carolina, we have a full representation of the plants from which the carbonaceous matter was derived, and no stronger proof of the wide difference between the floras of the Carboniferous and Triassic ages could be afforded than by the comparison of the plants preserved in the roof shales of the coal beds of Virginia and Pennsylvania; the first being Triassic, the second Carboniferous.

A large number of Triassic plants have also been found at the old copper mines near Abiquin, New Mexico, and at Los Bronces, Sonora, all representing the same botanical groups, cycads in large variety (*Otozamites*, *Podozamites*, etc.), a preponderance of monophyllous ferns, with a few of the finer-cut species.

Of the *Jurassic flora* of North America very little is known. The Triassic plants are for the most part from the upper members of the series, or Rhaetic beds of the Old World; and it is quite possible that the colored marls and clays which are found about Baltimore, forming the summit of the Trias, should be regarded as Jurassic. They have yielded quite a number of plants, principally cycads and finely divided ferns, all of new species.

Cretaceous Flora.—Nowhere in the world up to the present time has there been found an angiospermous leaf in the Triassic or Jurassic rocks. In India, China, Europe, America, the flora of the Jura and Trias has the character I have already ascribed to it; but resting immediately upon these beds so full of cycads, conifers and ferns we find in New Jersey, and in innumerable localities in the far West, the Lower Cretaceous sandstones and clays, full of the remains of plants, and these altogether unlike those which had gone before.

From causes which we cannot as yet understand, nor even conjecture, the vegetation of the world was at this period of its history more completely revolutionized than at any previous epoch; for here came in the angiosperms, by no transition indicated in the record, but by a sudden irruption. At the beginning of the Cretaceous age they seem to have spread over the earth's surface, and soon became the predominant and characteristic forms of vegetation, giving to Nature the aspect which she now exhibits.

In the Lower Cretaceous clays of New Jersey, and their equivalents, the Dakota group of the far West, the representatives of the Middle Cretaceous strata of the Old World, the remains of at least one hundred distinct species of angiospermous arborescent plants have already been found. With them are many conifers of Araucarian affinities, and fan palms like those of the present day; but the forests that covered the continent when the Cretaceous sea invaded it consisted mostly of oaks, willows, sassafrases, magnolias, tulip trees, sweet gums—the genera most abundant in our living forests. Here, then, we have according to the present state of our knowledge the beginning of our modern flora. As to where it originated, and by what influence it was developed, we as yet have no information; but inasmuch as a long period of time is probably represented by the line which divides our Triassic or Jurassic and Cretaceous rocks, an inter-

val in which the lowest members of the Cretaceous series were accumulating in the Old World, it is evident that we must go elsewhere to find the record of the gradual substitution of the angiospermous flora of the Chalk for the cycadaceous vegetation of the Trias and Jura.

In the studies that have been made of the foreign Cretaceous flora it is said that the change was gradual; first, a few angiosperms mingled with the predominating cycads and ferns; and subsequently, the angiosperms becoming more numerous. But it is also stated that no transitorial forms mark the passage from one flora to the other.

Descriptions of some of the Cretaceous plants of the far West were published in 1869 by myself, in a paper on our later extinct floras, which appeared in the *Annals of the N. Y. Lyceum of Natural History*. More recently a much larger number have been described by Mr. Lesquereux in one of the series of Dr. Hayden's Reports, devoted entirely to the Cretaceous flora.

Within the past year we have begun to open an herbarium of fossil plants in the Cretaceous beds of New Jersey, which promises to give us a more accurate knowledge of this flora than has been obtained from any other source. A large number of angiosperms and conifers have already been obtained from these beds, and Mr. Britton of this Society, will spend the coming summer in making further collections from the clays and sands along the Raritan River, so that when we meet again in the autumn I shall hope to be able to report some interesting results of this investigation.

Of the herbaceous and humbler elements of the Cretaceous flora we have as yet little knowledge, but the Cretaceous forest stands before us in well-defined characters. We rather pride ourselves now on the variety, beauty and majesty of our forest trees, but we have reason to believe that the forests of the Cretaceous included at least as large a number of species, and perhaps as imposing and beautiful individuals as those of the present day.

Since the Cretaceous flora consists of so many of the genera now growing in our climate, we must conclude that the climate which prevailed during the Cretaceous, within the area of our possessions, was also temperate, and that the theory somewhat widely promulgated that our flora began in the Arctic regions and spread south with the gradual decrease in temperature is without foundation in facts.

Tertiary Flora.—The flora of North America during the Tertiary ages seems to have been but a continuation of that of the Cretaceous. Many new genera and species were added, and a number of the latter are still in existence, but the botanical aspect of the flora was similar to that prevailing both before and after. During the Tertiary a mild climate extended over the entire North American continent, and as we know by the abundant remains of plants discovered in Alaska on Mackenzie's River, Disco Island and Greenland, a luxuriant flora similar in character to that of our Middle and Southern States was spread all along the northern sea-board. The remains of the living deciduous cypress, *Taxodium distychum*, have been found in nearly all the Tertiary deposits explored, even as far north as Greenland. The northern range of this species is now about the 36° of latitude, from which we may infer that the average annual temperature of the entire conti-

nent in the Tertiary age was above 50° Fahr. During this period there was a land connection between North America and Europe by way of Iceland and the Hebrides, and also with the Asiatic continent by way of Behring Strait. Taking advantage of this opportunity our American flora seems to have marched over and occupied both these continents. In Southern Europe the climate at the beginning of the Tertiary was sub-tropical, and the Indian Ocean communicated with the Atlantic through the Mediterranean. The gradual elevation of the Alps, Pyrenees, etc., during the Tertiary age, resulted in the formation of a barrier which limited the reach of austral influences and gave a temperate climate to the interior of Europe. At this time the American temperate flora descended from the north and occupied all Europe ; for we find in the Miocene or Middle Tertiary strata the remains of the deciduous cypress, our magnolias, the tulip tree, sweet gum, sassafras and the American poplars. When the Ice period came on, however, these plants were driven southward but found their retreat cut off by the Mediterranean, and were thus mostly exterminated. Subsequently, when a milder climate supervened, the vacant area thus formed was entered and possessed by a flora for the most part of Asiatic origin. In Japan and China, however, our American flora still exists. There is a remarkable similarity between the flora of Japan and that of Eastern America ; many of the species being identical, and others so closely allied that they must have had a common origin. We find, too, in China and Japan some interesting members of our American Tertiary flora, which, once common here, have been by some cause exterminated, while they still exist in Asia. Of these, perhaps the most striking examples are the *Salisburia* or ginko, a genus well represented in our Cretaceous and Tertiary flora, and the *Glyptostrobus*, another conifer which was abundant both in Europe and America in the Tertiary age, but, disappearing elsewhere, has survived in China.

I have said that our Tertiary flora was directly derived from the Cretaceous, and was the distinct progenitor of that of the present day. This is strictly true; but, if we may judge by the arborescent plants, our living flora is but a wreck and relic of that which covered our continent before the Ice period. We have already collected from the Tertiary strata in various parts of the country the remains of more species of forest trees than are now growing on its surface, and yet every year sees important additions made to the list. Imperfect as is the picture which these fragmentary fossils give us of the Tertiary flora, we find in it an explanation of some facts in the flora of the present day which have long puzzled botanists. For example, our giant trees, the two Sequoias of California, though of enormous size, are confined to very narrow geographical limits, the mammoth tree being restricted to a few groves ; so in our eastern forests the sassafras, the sweet gum, and the tulip tree are each a solitary representative of its genus, and it has been a matter of surprise that these noble and striking trees should have no living relatives ; but as we turn the pages of the Tertiary herbarium we find each of these genera represented by many species, and the species now living and restricted to narrow bounds, then having a very extended range, and existing in count-

less numbers. We find, too, that we have lost many of the grandest elements in the Tertiary flora ; for example, our sycamores (*Platanus occidentalis*, and *P. racemosus*,) were in Tertiary times represented by a half dozen species which are now extinct, and of these, two at least would seem to have surpassed in magnitude and beauty our common one, great and grand as it is; for I have leaves of two extinct sycamores that are each one and a half feet in diameter. Camphor trees, palms, and figs were also features in our Tertiary flora which exist no longer outside of the tropics.

The most potent influence which operated to change the flora of the Tertiary to that of the present day was undoubtedly the cold of the Ice period. Although less destructive here than in Europe, because the southern extension of our continent offered a place of retreat before the advancing ice-sheet, the substitution of an Arctic climate for the mild temperature which prevailed in Tertiary times throughout the northern portion of the continent, and the spread of unbroken fields of snow and ice over all the surface north of the fortieth parallel, caused the destruction of all plant life over three-fourths of the area covered with the luxuriant growth of the Tertiary vegetation. It also forced the remnant into such narrow quarters that vast numbers of species were exterminated, and left the flora in the fragmentary condition it now exhibits. The effect upon the fauna was still more disastrous, for a forest tree needs no greater space than is occupied by its roots in the earth and its branches in the air, while the surface required for the support of one of the larger mammals is much greater. Hence of the grand Tertiary fauna scarce a remnant survived, while of the plants, when better days returned, and the snow fields and ice-sheets retreated to Greenland, a sufficient number came back from their banishment to cover the central portion of the continent with a flora which retained all the essential botanical characters of that of the Tertiary, but the vicissitudes through which it had passed had told sadly upon it. Many of its grandest and most beautiful elements had disappeared forever, while a few of its magnolias, tulip trees, sequoias and liquidambars survive as solitary representatives of the groups to which they once belonged, and form groves instead of boundless forests. Overtopping in their grandeur, or outshining in their beauty, their present associates, they attest the general magnificence of those ancient forests that were composed of their progenitors and extinct relatives, their equal or superiors.

§ 58. **Adiantum Capillus-Veneris,** L., in Kentucky.—On the 28th of last month I received the following letter from Mr. Linney, containing a small piece of this fern.

Harrodsburg, Ky.

"DEAR W.—Mr. E. H. Gaither of this place found last week under a cascade, ½ mile from Burnside's Point, Pulaski Co., great quantities of *A. Capillus-Veneris*, if that is this form. Yours,

W. M. LINNEY."

I at once wrote to Mr. Linney to send me the best specimen he could get from Mr. Gaither, and to give me all the particulars about the locality. He sent me four very good plants, two of them measuring

15 inches in length, including stipe. Regarding the locality, he further says: "The Cincinnati Southern R. R. crosses the Cumberland River in Pulaski Co., ½ a mile down from the bridge, where there is a cascade falling over sub-carboniferous rocks. Within, around, and beneath the fall is the *Adiantum* growing in great profusion."

I intend visiting the locality in about two or three weeks and will then write full particulars. JOHN WILLIAMSON.

Louisville, Ky.

§ 59. **A Large Chestnut Tree.**—A fine specimen of *Castanea vesca*, L., var. *Americana*, Michx., stands in the township of New Barbadoes, Bergen County, N. J., half way between River Edge and New Milford stations on the N. J. and N. Y. R. R. about one hundred feet east of the railroad. The circumference at six feet from the ground is eighteen feet, which is slightly increased up to the first ramification at the estimated height of twenty-five feet. The very spreading and declining branches, themselves as large as ordinary trees, cover a space of ground not less than seventy-five feet in diameter. The tree is perfectly sound.

W. H. RUDKIN.

§ 60. **On the Northward Extension of the N. J. Pine Barren Flora on Long and Staten Islands.**—The famous Pine Barren region of N. J. extends with few interruptions all the way from the Lower Bay of New York to Cape May and the mouth of the Delaware River. It occupies a narrow belt, near the Atlantic coast with its northern portion, but expands as it extends southward so as to include nearly the whole of Southern New Jersey. The Flora of this section of North America has long been widely known to include some of the rarest and most beautiful plants to be found on our continent, and has, therefore, been thoroughly explored by botanists from all sections of the country.

The soil of this region, as all who have travelled through it will bear witness, is generally extremely sandy, but is occasionally more firm, in places where strata of clay approach and form the surface.

The ages of the geological formations which occupy this territory are, Tertiary in the portion lying to the south and south-east of a line drawn from a point on the Atlantic coast a few miles south of Long Branch, to another near the head of Delaware Bay; and Cretaceous, north of this line, and extending between it, and the southern edge of the Triassic formation, which follows a line from the centre of Staten Island to the vicinity of Trenton.

As the soil over both the Cretaceous and Tertiary is composed of similar materials, it is impossible to say, from surface indications just where one ends and the other begins.

The Tertiary pine barrens extend southward along the Atlantic coast to Florida; it is with the Flora of the northern extension of these sandy stretches, of *Cretaceous* age, with which we have to do at present. On Staten Island these strata are exposed in its extreme southern portion, occupying an area of perhaps one-fifteenth of the county; they doubtless extend over the entire southern and eastern

sections, but are there mostly covered by a layer of material of variable thickness derived from the Glacial Drift. In places this layer is very thin, and sandy soil appears. On Long Island the terminal moraine of the glacier occupies a position marked by a range of hills extending throughout its whole length, at an average distance of ten miles from the Atlantic. South of these hills, which have been appropriately called the backbone of the island, sandy plains prevail, the material composing them having been formed partly from the modified drift of the hills and partly from the underlying Cretaceous strata. In Suffolk County these plains occupy a considerable surface, and their flora has been very thoroughly worked up by our fellow member, Mr. E. S. Miller. The object of this paper is to call special attention to the number of characteristic plants of the New Jersey pine barrens which have already been detected in Staten and Long Islands, and which are recorded in the pamphlets, "The Flora of Suffolk County," and "The Flora of Richmond County," and their addenda.

First we will consider those species hitherto detected on the Creteceous soils of Staten Island, and not found on the Drift; there are 34 of these plants, and they are as follows:—*Magnolia glauca*, L.; *Hudsonia ericoides*, L.; *Ascyrum Crux-Andreae*, L.; *Arenaria squarrosa*, Michx.; *Polygala lutea*, L.; *Tephrosia Virginiana*, Pers; *Desmodium laevigatum*, DC.; *Desmodium viridiflorum*, Beck; *Rubus cuneifolius*, Pursh.; *Crataegus parvifolia*, Ait.; *Eupatorium rotundifolium*, L.; *Aster nemoralis*, Ait.; *Aster concolor*, L.; *Chrysopsis Mariana*, Nutt.; *Gnaphalium purpureum*, L.; *Gaylussacia dumosa*, T. & G.; *Andromeda Mariana*, L.; *Kalmia angustifolia*, L.; *Ipomoea pandurata*, Meyer; *Phlox subulata*, L.; *Asclepias obtusifolia*, Michx.; *Euphorbia Ipecacuanhae*, L.; *Quercus nigra*, L.; *Quercus prinoides*, Will.; *Quercus Phellos*, L.; *Spiranthes simplex*, Gray.; *Juncus scirpoides*, Lam., var. *macrostemon*; *Xyris flexuosa*, Muhl., Chap.; *Cyperus cylindricus*, N. L. B.; *Stipa avenacea*, L.; *Glyceria obtusa*, Trin.; *Panicum verrucosum*, Muhl.; *Andropogon macrourus*, Michx.; *Lycopodium inundatum*, L., var. *Bigelovii*, Tuck.

Of these the following four have not been detected in Suffolk County:—*Desmodium viriäiflorum*, Beck.; *Rubus cuneifolius*, Pursh.; *Ipomoea pandurata*, Meyer.; *Phlox subulata*, L.

In addition to the above list, however, the following sixteen additional species have been detected in Suffolk County:—*Drosera filiformis*, Raf.; *Ascyrum stans*, Michx.; *Eupatorium hyssopifolium*, L.; *Eupatorium leucolepis*, T. & G.; *Eupatorium album*, L.; *Aster spectabilis*, Ait.; *Solidago puberula*, Nutt.; *Chrysopsis falcata*, Ell.; *Helianthus angustifolius*, L.; *Coreopsis rosea*, Nutt.; *Utricularia subulata*, Le Conte.; *Cupressus thyoides*, L.; *Juncus pelocarpus*, E. Meyer; *Xyris Caroliniana*, Walt.; *Eleocharis melanocarpa*, Torr.; *Sporobolus serotinus*, Gray.

Thus it appears that 34 of these characteristic pine barren plants grow in the southern part of S. I., and that 46 of them have been detected in Suffolk Co., L. I. I have no doubt that these lists will be augmented by future explorations.

As we proceed eastward from L. I., we find that there are a few of these same plants growing on soil of Tertiary age in the southern parts of the Eastern States; and it would seem that these species have a tendency to follow the course of the two more recent geological formations, throughout their whole extent along the Atlantic coast. Another fact which stands out prominently in this connection, is that not a single one of the above-mentioned plants, growing, as we have seen, just along the edge of the mantle of Glacial Drift is native of Europe; that is, they belong to a true American flora, which had its origin in the southern part of the continent. In contrast to which fact, we have another one, equally prominent, and that is, that of the species of plants growing on the material brought down by the ice sheet, about one-third are common to northern Europe and America, thus pointing to a common origin of each in the territory now occupied by the ice and snow of the Arctic regions.

N. L. Britton.

§ 61. **Teratology.**—*Lilium candidum* often has the uppermost flower 5-merous; all that I have noticed this year were so. I have seen 6-merous *Sarracenia purpurea*, and 4-merous *Tigridia*—the large cultivated species, (*Pavonia?*). D. C. E.

§ 62. **Botanical News.**—Trimen's *Journal of Botany* for June contains:—A Review of the British Characeae (2 plates), continued, by H. and J. Groves; Remarks on Botanical Nomenclature, by B. Daydon Jackson; Botany of the British Polar Expedition of 1876-7, by H. C. Hart; Wilhelm Philip Schimper, by W. Carruthers.

The *Botanical Gazette* for June contains the following notes:—Vitality of the Seeds of Serotinous Cones, and Fraxinus quadrangulata hermaphrodite, by G. Englemann; Notulae exiguae, by A. Gray; Platanthera bracteata, and Double Thalictrum anemonoides, by T. Meehan; Cobaea scandens proterandrous, by W. W. Bailey; Notes on certain Silkweeds, by Edward L. Greene; Notes from Florida, by A. H. Curtiss; A Natural Botanic Garden, by J. M. Coulter; Some Plants of Franklin County, Ky., by R. H. Wildberger; and Notes from Illinois, by H. L. Boltwood.

The *Gardeners' Chronicle* states that at the meeting of the Linnean Society on June 3, a paper was read by Mr. George Murray "On the Application of the Results of Pringsheim's Recent Researches on Chlorophyll to the Life of the Lichen." Summarizing the results of Pringsheim's labours, the author considered the suggestion of Dr. Vines that, by the aid of an artificial chlorophyll screen, the protoplasm of fungi might be excited to the decomposition of carbonic acid, and contended that this proposed experiment is proceeding naturally in lichens. He pointed out that in these organisms we have the fungal tissues in the body of the thallus, and the chlorophyll screen in the gonidia; and that light traversing the chlorophyll-containing gonidia —often occuring as a dense layer—excites in the fungal tissues the decomposition of carbonic acid. In evidence he adduced the plentiful occurence in the fungal hyphae of starch, or rather lichenin —a substance of the same chemical composition as starch $C_{12}H_{10}O_{10}$

and formed from it by the action of the free acids of the plant. In conclusion, he submitted that this process tended to explain the nature of the consortism of the fungal and algal elements in the lichen, and thus to support the views of Schwendener.

In *Nature* for June 17, Dr. A. Ernst, of Caracas, gives a very interesting account of the fertilization of *Cobaea penduliflora*, Hook. f., a species closely allied to the *C. scandens* so common in cultivation. He finds that the disk only secretes nectar immediately after the anthers burst, and that it is then produced in considerable quantity, and that unless the plants are cross-fertilized the same night, either by moths or artificially, the fruit is not developed. "As soon as the corolla has fallen off, the peduncle withdraws slowly amongst the dense foliage where the fruit develops, protected from all kinds of injury."

The current number of Case's *Botanical Index* has, among its varied contents, a communication from a Canadian correspondent in regard to a monstrous specimen of *Fuchsia*, and which is apparently, from the description and accompanying figure, a case of pleiotaxy or repetition of the calyx. The *Fuchsia* does not appear in the short list of those plants in which this kind of change has been observed to occur by Dr. Masters and others.

Grevillea for June contains: An introductory List of Desmidiaceae found in the British Islands, since Ralf's Desmidieae; Observations on Peziza by M. C. Cooke; Hymenochaete and its allies, by M. C. Cooke; Fungi of Australia, by C. Kalchbrenner; Dacrymyces succineus, by W. Phillips.

Some observations, which will prove of interest to those engaged in the study of the algae, have been made by Herr Stahl on the motion caused by the effects of light on some minute species belonging to the Conjugatae. He finds that *Closterium moniliferum*, one of the Desmids, under diffuse daylight of little intensity, presents its longitudinal axis to the light rays, one-half of the cell being alternately attracted and the other half repelled, so that both halves are equally exposed to light. When the intensity of the light was increased the cells changed their position, and placed themselves at right angles to the incident light.

The *Gardeners' Chronicle* (July 10) gives an illustration of a peloric orchid, which at first sight so much resembles a flat-petalled iris that it might well be mistaken for one. It represents a flower of *Laelia purpurata* in which the three sepals were equal in size and shape, as also were the three petals—the latter being all deeply colored and lip-like. In the centre of the flower was a three-toothed column with no anthers. Below the flower were indications of a three-celled ovary, the cells being placed opposite to the sepals. Allowing for the absence of the stamens, the diagram of the flower was exactly that of an iris. From the same number of the *Chronicle* we learn that the entire cryptogamic herbarium (including original drawings, dissections, and notes) of the late Prof. W. P. Schimper, of Strasburg, whose important works upon mosses are so well known, has been purchased by the Baroness Burdett Coutts, and presented to the Herbarium of the Royal Gardens, Kew.

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BULLETIN
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§ 63. **Fern Notes.**—In re-arranging the specimens in the "Davenport Herbarium," I noticed quite a number of examples of bifurcation that it may be of interest to place on record.

In *Polypodium vulgare* examples occur with bifid fronds and segments. In *P. Californicum* and *P. falcatum* no examples occur; but in these two species the segments are frequently coarsely and deeply serrate.

In *Notholaena Parryi* an example occurs in which the stipe forks midway and branches into a double frond. Similar examples of "twin-fronds" occur in *Camptosorus*, *Asplenium Trichomanes*, and *Woodsia obtusa*.

In *Cheilanthes Cooperae* one frond forks just above the second pair of pinnae into two divisions nearly three inches long.

Cheilanthes Clevelandii has several specimens of bifid fronds, and *Pellaea atropurpurea*, of bifid fronds and pinnae.

Some sections of *Pteris aquilina* var. *lanuginosa* have bifid pinnae and pinnules.

Scolopendrium and *Camptosorus* especially delight in such manifestations; the former exhibiting some deeply bifurcated fronds, and the latter some curious freaks. Two examples of "twin-fronds," exactly as described by Mr. Tweedy in the BULLETIN, Vol. VII. p. 26, occur, and one in which the long-attenuated apex bifurcates into two long proliferous tips. Mrs. Barnes contributes some curious abnormal forms of this species from Onondaga Co., N. Y.

Asplenium ebeneum, besides its proliferous fronds, *A. montanum* and *A. firmum*, all bifurcate more or less deeply, as do also *Aspidium acrostichoides*, *A. Thelypteris*, and *A. Noveboracense*.

In *A. spinulosum* and varieties, double-fronded, bifurcate and crested forms occur, and also in *Cystopteris fragilis* and *Dicksonia*.

Woodsia glabella has one example of a bifid frond, and in the *Botrychia* all sorts of freaks occur—sterile sections transformed into fertile, and vice versa; bifid stalks; and extra fertile spikes growing either out from the main stalk or from the axils of the sterile divisions.

The Herbarium is now in perfect order, with an "Index" for reference. The collection contains nearly 600 mounted sheets, and over 2,000 specimens, but is deficient in *root specimens* of the following: *Gymnogramme hispida*, *Notholaena ferruginea*, *N. Hookeri*, *N. nivea* (of which I have some fragments collected on Lone Mountain, New Mexico, early in June, 1880, by Wm. M. Courtis), *N. tenera*, *Cheilanthes Wrightii*, *C. Lindheimeri*, *C. leucopoda*, *Pellaea aspera*, *P. pulchella*, *P. flexuosa* and *P. ternifolia*. *Complete root specimens* of any of these are desired and solicited.

Since the publication of my Catalogue, many new forms have

been added, and I have to thank Mr. Lemmon for *Aspidium Mohrioides*; Dr. J. Schneck for *Aspidium Oreopteris*; J. Donnell Smith for a fine series of specimens of *Aspidium conterminum*, var *strigosum*; W. G. Wright and the Parish Bros. for additional and fine series of specimens of *Cheilanthes viscida*.

Notholaena Lemmoni has not yet been added to the Herbarium. *N. nivea* appears to have been collected nearly simultaneously in Arizona by Lemmon (vide June BULLETIN) and in New Mexico by Courtis. GEO. E. DAVENPORT.

§ 64. **Artificial Synopses.**—Since the adoption of the natural system of classification, recourse has been had to "artificial keys," to a greater or less extent, for the purpose of facilitating the determination of species. There is a tendency to overlook the natural relationship of plants, growing out of the use of these keys, which can only be avoided by a careful study of the principles of classification in general and its application to botany in the morphological and structural relations of the members of the vegetable kingdom.

A wrong impression is often tacitly conveyed to students just commencing the study, namely, that the chief end of the "analysis of plants" is to determine botanical names, when this is really a matter of convenience of secondary importance; while the first object should be *the determination of the structural characteristics of the plant in hand*, which at once distinguish it from all others, and indicate its relation and position in the vegetable kingdom. If the more modern plan of imparting botanical instruction were rigidly carried out, namely, requiring the student to write *in accurate botanical language* the diagnostic characters of every plant studied in the preliminary course of instruction (say 50 or 75 plants), the number of those whose early habits of study will remain a stumbling-block in the further pursuit of botanical knowledge would be vastly decreased, and the number of those who become intensely enthusiastic in the science, and capable of thorough and systematic post-graduate study would receive a corresponding increase. To such, artificial keys are useful in economizing time, while the knowledge of structural relationship will not be concealed or overlooked in the abbreviated process.

A "manual" for beginners is useful in proportion as it is accurate and easy of application. Some of our botanical orders containing our most common plants are difficult for beginners chiefly for the reason that the generic and specific "synopses" of the text-books are founded on characters not readily determined, or are of themselves difficult of application, requiring a vast amount of searching to find the appropriate division. The following synopses may be found useful in the determination of species in a few of these difficult orders after the characters of the plants are carefully noted. I have found it convenient in studying the *Salicaceae* to mark those species whose catkins appear before the leaves, with numbers wired to the plant; greater accuracy is thus insured and the variations in the same plant from year to year may be also studied with profit.

Artificial Synopsis of the Umbelliferae.

A	Umbels simple or irregularly compound	B.
	Umbels regularly compound	D.
B	Leaves with no true blade	Crantzia.
	Leaves simple	C.
	Leaves 2–3 ternately divided	Erigenia.
C	Leaves linear or lanceolate	Eryngium.
	Leaves orbicular or reniform	Hydrocotyle.
	Leaves palmately lobed or parted	Sanicula.
D	Flowers white or greenish	E.
	Flowers yellow or purple	Q.
E	With hollow petioles in place of leaves	Tiedemannia.
	Leaves finely dissected	Discopleura.
	Leaves pinnately divided or compound	F.
	Leaves ternately divided or compound	I.
F	Involucre several leaved	G.
	Involucre almost wanting	H.
G	Carpels bristly	Daucus.
	Carpels five-ribbed, otherwise smooth,	Sium.
H	Leaves simply-pinnate	Archemora.
	Leaves 2–3 pinnate	Conioselinum.
I	Involucre almost wanting	J.
	Involucre more conspicuous	N.
J	Leaves trifoliate	Cryptotaenia.
	Leaves 1–3 ternate	K.
	Leaves ternately decompound	Chaerophyllum.
K	Involucels bristly	Eulophus.
	Involucels few leaved	Aethusa.
	Involucels many leaved	L.
L	Marginal flowers radiant	Heracleum.
	Flowers uniform	M.
M	Carpels with three slender ribs ; calyx obsolete	Angelica.
	Carpels with three stout ribs ; calyx teeth short	Archangelica
N	Leaves 2–3 ternate	O.
	Leaves decompound	Conium.
O	Carpels bristly	Osmorrhiza.
	Carpels ribbed, not bristly	P.
P	Fruit elliptical ; involucels linear	Ligusticum.
	Fruit subglobose ; involucels many leaved	Cicuta.
Q	Leaves simple, entire	Bupleurum
	Leaves pinnately divided or compound	R.
	Leaves ternately divided or compound	S.
R	Involucels bristly	Polytaenia.
	Involucels small or none	Pastinaca.
S	Leaflets entire	Zizia.
	Leaflets incised	Thaspium.

[The caraway (*Carum carui*) is thoroughly naturalized in Central New York, and is even becoming a troublesome weed in some places. It is not in the Manual and so we suppose has here been omitted. One meeting with it would be brought to "H" of the synopsis.—Eds.]

Synopsis of the Northern Carices.

The numbers refer to the species described in Gray's Manual (edition and issue of 1868).

A	Spike solitary	B.
	Spikes two or more	E.
B	Spike dioecious	No. 1–2.
	Spike androgynous	C.
C	Spike staminate at summit	D.
	Spike staminate at base	Nos. 1, 2, 36, 138
D	Bracts and scales of fertile flowers leaf-like	No. –79.
	Bracts and scales never foliaceous	No. 3–6.
E	Stigmas 2	F.
	Stigmas 3	I.
F	Spikes dioecious	Nos. 11, 33.
	Spikes androgynous	G.
	Spikes monoecious	H.
G	Pistillate flowers below	No. 13–28.
	Pistillate flowers above	No. 29–45.
	Pistillate flowers variously situated	No. 10–12.
H	Staminate spike solitary	No. 65.
	Staminate spikes 1–3	No. 46–56.
I	Staminate spike solitary	J.
	Staminate spikes 2 or more	W.
J	Perigynia with merely a point without a beak	K.
	Perigynia with a distinct beak	N.
K	Perigynia smooth	L.
	Perigynia hairy	M.
L	Scales black, purple, or brown	No. 46–64.
	Scales brownish, tawny, or white	No. 65–81.
	Bracts green and foliaceous	No. 84–91.
	Bracts reduced to colored sheaths	No. 92–3.
M	Bracts narrow, foliaceous	No. 82–3.
	Bracts reduced to colored sheaths	No. 92–3.
N	Perigynia not at all or only slightly inflated	O.
	Perigynia moderately or much inflated	U.
O	Perigynia smooth	P.
	Perigynia hairy	S.
P	Beak entire	No. 102–3.
	Beak two-toothed	Q.
Q	Perigynia only slightly inflated	R.
	Perigynia moderately inflated	No. 120–7.
R	Perigynia few nerved or nerveless	No. 104–110.
	Perigynia nerved, tawny-yellow at maturity	No. 111–115.
S	Bracts short, leaves all radical	No. 94–101.
	Bracts leafy, long	T.
T	Perigynia slightly inflated	No. 102–3.
	Perigynia moderately inflated	No. 120–7.
U	Perigynia conspicuously nerved	V.
	Perigynia few nerved	No. 137–8.
V	Perigynia moderately inflated	No. 120–7.
	Perigynia much inflated	No. 128–36.

W	Perigynia not at all or only slightly inflated	X.
	Perigynia moderately inflated	No. 120–7.
	Perigynia much inflated	No. 139–151.
X	Perigynia with merely a short point	Y.
	Perigynia with a distinct beak	No. 116–19.
Y	Scales black, purple, or brown	No. 46–64.
	Scales brownish becoming white	No. 71.

SYNOPSIS OF THE NORTHERN SPECIES OF SALIX.

A	Catkins sessile appearing before the leaves	B.
	Catkins lateral with 4–5 leafy bracts at base	I.
	Cakins borne on the summit of lateral leafy shoots of the season	J.
B	Ovaries stalked	C.
	Ovaries sessile or nearly so	H.
C	Leaves entire or obscurely wavy toothed	D.
	Leaves serrate	F.
D	Leaves petioled	E.
	Leaves almost sessile; shrub 1°–1½° high	*S. tristis.*
E	Leaves taper-pointed; ovary densely wooly	*S. candida.*
	Leaves abrupt at apex; ovary silvery hairy	*S. humilis.*
F	Leaves smooth above	G.
	Leaves downy above; stigma sessile	*S. sericea.*
G	Leaves finely and evenly serrate	*S. petiolaris.*
	Leaves irregularly toothed, entire at base and apex	*S. discolor.*
H	Filaments united; leaves oblanceolate	*S. purpurea.*
	Filaments separate; leaves linear-lanceolate	*S. viminalis.*
I	Ovary smooth, lanceolate	*S. cordata.*
	Ovary silky hoary, almost linear	*S. livida* var. *occidentalis.*
	Ovary silky, ovoid conical	*S. chlorophylla.*
J	3° or less high	K.
	Trees; 12°–80° high	M.
K	Stem upright	*S. myrtilloides.*
	Prostrate or spreading; alpine species	L.
L	Ovary smooth, sessile	*S. herbacea.*
	Ovary smooth, short-stalked	*S. Cutleri.*
	Ovary silvery silky	*S. argyrocarpa.*
M	Stamens 3–6 or more; ovary stalked, glabrous	N.
	Stamens 2; ovary nearly sessile, glabrous	O.
	Stamens 2; ovary stalked, downy	*S. longifolia.*
N	Pods taper-pointed; stamens 5	*S. lucida.*
	Pods short ovate; stamens 3–6	*S. nigra.*
O	Leaves smooth, glaucous beneath	*S. fragilis.*
	Leaves silky beneath	*S. alba.*

LUCIEN M. UNDERWOOD.

§ 65. **Ophioglossum palmatum,** Plumier.—Truly, many and queer are Nature's freaks in shaping leaves, but I think she really surpasses herself in the odd forms she uses in the manufacture of *Ophioglossum palmatum.* Of about thirty specimens of this rare plant, which I received from the Indian River country last summer,

scarcely any two had any particular resemblance to each other. If a child had taken scissors and cut out the leaves, snipping out notches here, and leaving prolonged points there, while abruptly snipping them off in still other places, no queerer shapes could be found. They are grotesque and misshapen; not one can be called "pretty" (though the texture of the frond is daintily thin), and the fruiting-spikes always vaguely remind me of rattlesnakes and their rattles. Fronds simple and ovate, lanceolate or broadly wedge-shaped; or two-lobed, one lobe twice as long as the other, and both knocked over on one side at right angles to the stem; or three, four or five-lobed with short upper lobes and a much-pulled-out lateral lobe; obtuse, acute, scalloped, square or emarginate tips; the variety is endless. The fruiting-spikes vary in number, some of the smallest fronds only an inch or two long, stem and all, and less than an inch wide, bearing three or four; while larger ones, with stem three or four inches long and blade two inches long by same breadth, can scarcely perfect one good spike.

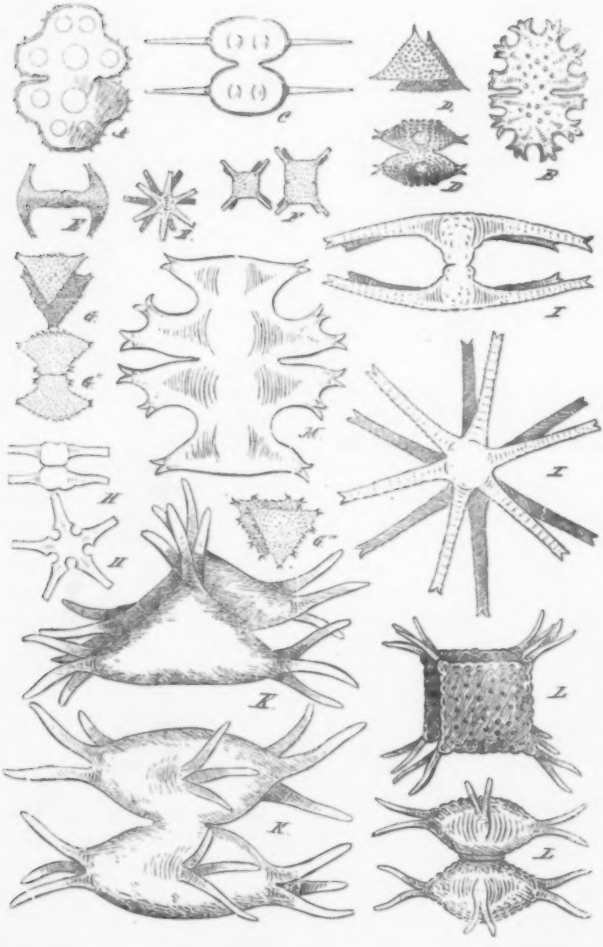
ST. AUGUSTINE, FLA. MARY C. REYNOLDS.

§ 66. **A New Sphaeria on Grapes.**—In the early part of the present month (May, 1880) my friend, Dr. E. C. Bidwell, of Vineland, N. J., wrote me that he had found the ascigerous form of the fungus to which *Phoma uvicola* belongs. The grapes on which the fungus in question was found had been struck with the rot last season, and were still hanging dry and shrivelled on the vines and well covered with the *Phoma*. Dr. B., who has for some years past been investigating the grape-vine fungi, placed for the purpose of experiment some of these shrivelled grapes in water where they were allowed to soak for three or four days. At the expiration of this time many of the perithecia (which before contained only spores of the *Phoma*) were now filled with well-developed asci, in which the sporidia were not yet fully matured. Having read the account of Dr. B.'s discovery, I at once examined the grape-vines in my own vicinity, and found lying on the ground under the grape trellis a few shrivelled grapes, which afforded some ascigerous perithecia, together with an abundance of *Phoma*. These grapes, perhaps from the fact of their having lain on the ground where they had imbibed a greater amount of moisture, were in a more advanced stage of development than those hanging on the vines.

The fungus in question is a *Sphaeria* of the section *Subtectae*, Fr., and in honor of its discoverer is here proposed as

Sphaeria Bidwellii., *n. sp.*, briefly characterized as follows: S. peritheciis minutis globosis epidermidi tectis demum suberumpentibus, apice poro pertusis; ascis clavate-cylindraceis obtusis .0027′x .0005′, sporidias, octo irregulariter ellipticas vel oblongas (continuas?) .0005′–0007′x.00015′–.0002′ foventibus; paraphysibus nullis.

The specimens thus far examined appear not to be fully mature, the sporidia being filled with granular matter and a few oil globules, so that their ultimate shape cannot now be perfectly defined. There appears to be quite a variation in their form, from regularly elliptical



NEW AMERICAN DESMIDS.

to oblong. This latter form has only been observed in *free* spores, which appear, however, to be true sporidia. J. B. ELLIS.

NEWFIELD, N. J., *May 26*.

Since found also on old grape petioles and twigs of last year's growth. J. B. E.

§ 67. **Adventitious Leaves in Rhus.**—A malformation occasionally makes its appearance in *Rhus glabra*, L., in the vicinity of New York, and may perhaps be common to this species wherever it grows. The deformity consists in the entire (rarely partial) substitution of a dense mass of narrow, simple crispate leaves for the inflorescence. This condition is accompanied by a change in the form of the uppermost leaves; these being sometimes simple, with laciniate margins, and sometimes pinnate, with deeply-cleft leaflets, and partially-winged petioles. Occasionally this deformity is not observed in a given locality for several years, and then again it makes its appearance and is quite common. This year it has been observed near Tenafly, N. J., at White Plains, and on Long Island in the vicinity of New York.

§ 68. **New American Desmids.**—The figures in the accompanying plate (Plate V.) illustrate the new species of *Desmidiaceae* described by me in the April number of the BULLETIN, pp. 45–47:—A. *Euastrum Donnellii;* B. *E. formosum;* C. *Arthrodesmus fragilis;* D. D. *Staurastrum subarcuatum*, front and end view; E. E. *S. comptum*, front and end view; F. *S. pusillum*, front and end view; G. G. G. *S. fasciculoides*, front and end view, and variety; H. H. *S. pulchrum*, front and end view; I. I. *S. macrocerum*, front and end view; K. K. *S. tricornutum*, front and end view; L. L. *S. Nova-Caesareae*, front and end view; M. *Micrasterias Kitchellii*, front view. FRANCIS WOLLE.

§ 69. **Nectar, its Nature, Occurrence, and Uses,** by William Trelease, Ithaca, N. Y., with illustrations. *From the Report on Cotton Insects, by J. Henry Comstock, Entomologist to the United States Department of Agriculture.* In a preliminary note Mr. Trelease says: "Since nectar is found in several parts of the cotton plant, and presents some peculiar phenomena there, it has been thought best that I should treat briefly in this place of its occurrence and economic value; hence the present essay. My plan has been to indicate what I understood by the word nectar; to describe some of the more instructive instances of its occurrence, in an order depending entirely upon the nectariferous organs; to arrange them according to the purpose which the nectar serves in each case; to discuss some of the cases more at length, and, finally, to briefly mention the habits of some nectar-loving animals when in quest of this beverage. Though limited time and prolonged ill-health have prevented me from making this essay what I wished it to be, I trust that it may not be found wanting in what it professes to be—an outline of the uses of nectar as we now understand them." After a discussion of the various definitions of nectar, the author gives the following:

"Nectar—a fluid always sapid, usually sweet, often odorous, which is elaborated in any part of a plant, remaining where formed or making its way to some other part; its *raison d'être* being the necessity for the removal of some useless or injurious substance, or as some provision to attract nectar-loving animals to the plant for some definite purpose." This is rather long for a definition, and it might be objected that it includes resinous exudations. After grouping the various positions of the nectaries under the general heads of floral or extra-floral, Mr. Trelease discusses specially those on the several divisions of these parts.

On the cotton plant the most copious source of nectar is the base of the bracts which surround the flower, and to it are attracted many ants, wasps and bees, and during the night previous to the flowers unfolding thousands of the moths whose larvae are most destructive to the flowers and fruit. "So it appears that the secretion of these glands first attracts the worst enemies of the plant, and then attracts their enemies, which afford it partial relief from the misfortune that it has brought on itself."

The whole essay will be found entertaining and instructive. Appended is a very valuable index to all books or articles treating of nectar and the fertilization of flowers in general.

§ 70. **Irritability in Robinia.**—The *Comptes rendus* of the French Academy (Tome XC. No. 21) contains a note by Mr. T. L. Phipson on the development of irritability in *Robinia Pseud-acacia*, L. The author tried some experiments last year to ascertain whether he could produce in this tree phenomena of sensitiveness (or excitability, to use Dutrochet's term) like those observed in the sensitive plant. His first experiment was made at half-past five o'clock in the afternoon of Sept. 17th, while the sun was shining brightly. He found that on subjecting the terminal leaflet to 10 to 20 quite strong raps with his finger, the lateral leaflets soon began to approach each other, and that at the end of five minutes the whole leaf was in the same state of "sleep" as at midnight. The lateral leaflets closed up one after the other, beginning with the one nearest the terminal leaflet, just as they are observed to do in the sensitive plant. The author found that it afterwards required two or three hours' strong sunshine to cause the leaflets to expand and resume their horizontal position. Subsequently, he tried the effect of strong heat on the terminal leaflet, and found that he could burn it to a crisp without affecting the lateral leaflets—a result directly opposite to that obtained in a like experiment with the sensitive plant. From this he concludes that the sap moves more slowly in the former than in the latter plant. From these experiments the author believes that he has obtained additional evidence in support of an opinion put forth by him in 1876, that: "The reason why the movements of the sensitive plant have been regarded as so marvellous is that, up to the present time, they have been looked at as something entirely exceptional, whereas they are only the highest degree of development of a phenomenon, the traces of which we can follow throughout the entire vegetable kingdom."

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII.] New York, September, 1880. **[No. 9.**

§ 71. **Proceedings of the Torrey Club.**—The regular monthly meeting of the Club was held at the New York College of Pharmacy, Tuesday evening, Aug. 10th. In the absence of the presiding officers, Dr. J. W. Barstow occupied the chair. There were fifteen members present.

Plants Exhibited.—Dr. Barstow exhibited a specimen of *Sarcodes sanguinea*, Torr., from California. Mr. A. Brown exhibited a large number of interesting adventive plants gathered in Eighth Avenue, near the Harlem River. Among these was *Galeopsis Ladanum* L., var., *angustifolium*, which he stated was growing there in great abundance. Mr. Bicknell displayed a large specimen of *Boletus felleus*, Fr., from Riverdale; specimens of *Typha latifolia*, L., showing fission of the spike; and a specimen of *Cyperus ovularis*, Torr., in which one of the upper leaves had at an early stage been split at its base, and in this aperture had grown a sessile spike of flowers. From the base of the spike sprang another leaf whose apex had grown through a small cleft in the larger leaf, thus enclosing the spike firmly in a sort of net-work. Specimens of *Aspidium Goldianum*, Hook., from White Plains were shown by Mr. O. R. Willis.

Adventive Plants, and New Stations.—Mr. Brown stated that he had recently detected *Paspalum distichum*, L., at Communipaw, N. J., and that *Potentilla fruticosa*, L., had been found by him this season at Tenafly, N. J. Tenafly was mentioned as a new station for *Hypericum adpressum*, Bart., the plant having been detected there this summer on the occasion of a field meeting.

Habenaria ciliaris, R. Br.—Attention was called to the fact that at a recent field meeting of the Club at Tenafly, this orchid was found there in great profusion—several acres of land being thickly dotted with its conspicuous orange-colored blossoms. According to observations made for several years past at this station by a few members of the Club, this species of *Habenaria* appears to flower only each alternate year.

Narthecium ossifragum, Huds. Mr. Leggett, during the course of some remarks on the results of a recent field meeting held at White Plains, stated that he had examined *in situ* the alleged *Narthecium* reported from that locality at the last meeting of the Club, and had positively determined from the leaves (the plant being no longer in flower) that it belonged to quite a different genus. Mr. Leggett's assertion was confirmed by an examination of dried specimens, which were exhibited to the Club later in the evening. The publication of the report before the reception of specimens was an oversight.

Dr. T. E. Wilcox, U. S. A., of Boise City, Idaho, was elected a corresponding member.

§ 72. **Ferns on the Cumberland.**—In the BULLETIN for June I reported the finding of *Adiantum Capillus-Veneris*, L., in Kentucky. I promised your readers then that I would probably visit the locality and give full particulars regarding the fern flora of this unexplored region.

The Cumberland River is a beautiful stream of clear water flowing through a very wild country and having high sandstone cliffs on each side. The mountains are well wooded. Hemlocks, oaks, chestnuts, birches, two magnolias and the tulip tree predominating; vacciniums, laurels and rhododendrons forming the undergrowth. The river opposite our tent was about 200 rods wide, but very shallow; it narrows somewhat, nearer the falls. Here the river is precipitated over the conglomerate table-rock with a vertical fall of sixty-three feet. The scenery below the falls is very grand. Sailing down in a boat one sometimes gets under some great overhanging ledge whose brow is richly clothed with *Polypodium vulgare*.

My first ramble was over the hills below the falls. I had not proceeded far when I found a few plants of *Lygodium palmatum*, an old favorite that I first met with a few years ago in Rockcastle Co., Ky. Tramping carelessly along, the climbing beauty seemed to haunt me; if I looked up, there it was hanging in heavy tresses from the cliffs above, away out of reach; if I looked under my feet, there it was ready to entangle me in its mazy web; move in any direction, it would stare me in the face, seeming to say—"You need not pass laws for my protection, you will never uproot me from my mountain retreat." I wondered sometimes whether the Virginia creeper or this beautiful fern would have the mastery. One bench of rock projecting out from two perpendicular cliffs, was just one mass of *Lygodium*; it was impossible to separate the plants, they were so twined and twisted and matted together.

I journeyed on, looking out for other rarities. *Asplenium pinnatifidum*, *A. Trichomanes*, *A. ebeneum* and *A. montanum* were found quite plentiful. Here, towards the top of the range, there are a great many precipitous rocks, which are tunneled out at the base, forming dark and damp recesses. In some of these places I expected to find *Trichomanes radicans*. I had not searched very far when my toil was rewarded. There it was, growing in the greatest profusion, seeming to fancy the corner darkest and furthest from the light. With difficulty I removed the roots from the rock. There was little or no soil, but the roots seemed to have become part of the rock itself. This translucent beauty has evidently no desire to be removed from its secret hiding place. I also found the more common forms of ferns quite plentiful. My further walks added very little of interest. I delighted to observe the *Lygodium* growing in such profusion, and found a few plants of *Pellaea atropurpurea* growing on a sandstone cliff. This to me was of some interest, as heretofore I have always found this plant associated with limestone.

About fifty feet from this rock, I was fortunate in finding three or four plants of the *Adiantum Capillus-Veneris*, but they were very sickly-looking, and not over four inches in length. This, however, satisfied me that the fern was in the neighborhood and made me resume my search. The locality already reported for this fern was

forty miles away; but, from seeing these few plants, I made sure I should succeed in finding it here in greater profusion. I was disappointed. I searched everywhere, into every crevice and every likely place. Occasionaly I would come across an overhanging ledge, and find my old friend, the *Trichomanes*, but no Venus-hair. After a week's diligent search, I abandoned the field and repaired to Point Burnside.

Point Burnside is a station on the Cincinnati Southern R. R., at the head of the navigable waters of the Cumberland River. The south fork of the Cumberland joins the main river at this point. The river is not so wide as at Cumberland Falls, but much deeper. I found I had got into a very different geological region from that at the Falls. The bed of the river and the range of cliffs on each side were limestone, but the high ranges were all capped with sandstone. On the lower cliffs I found in great abundance, beautiful specimens of *Pellaea atropurpurea*, and, to my surprise and delight, *Asplenium parvulum;* but I was anxious to visit the cascade, the reputed home of the maidenhair.

Getting into a canoe or dug-out, and with the assistance of a guide, I paddled down stream, about half a mile. I got out and walked towards the water-fall, and in a moment was perfectly entranced. I wondered if it was a dream or a reality. Could it be possible that this lovely fern should be growing in such great profusion. Yes, there it was, having probably been growing for thousands of years, unheard of and unsung. Imagine a hill side torn asunder by some unknown force, forming precipitous crags and deep cave-like recesses, with huge masses of rocks lying at the base, and numerous streams of the clearest cold water, rushing in every direction, and all overgrown with mosses, liverworts, maidenhair and the bulbous bladder-fern. Every rock, every crevice, was just one great mass of *Adiantum*. In the dark hollows, where the sun seldom penetrated, the fronds were thin and delicate, with leaflets broad and fringed like those of *A. Farleyense* of the greenhouses. The main cascade is about eighty feet high, and over it was pouring quite a stream of water. The rim or border of this cliff was a mass of fern fronds, some about 30 inches in length from the rootstock, hanging down away out of reach of the destroyer, if he should ever find this place. With some difficulty I ascended the top of the hill, as I wanted to see where all the water was coming from. The highest point is about three hundred feet above the river bed. A little from the top my guide showed me a cave out of which the water was flowing. The mouth of this cave measured about twelve feet in width, forming an arch of about six feet at the highest point. At the present time the water was making a pretty swift stream. The ground is somewhat flattish a little above the cascade, causing the water to distribute itself in different directions before falling, thus making the beautiful series of falls, as one looks up from below. The *Adiantum* is growing in great profusion from the cave mouth down to the base of the cliff, and immense bunches of it are found on the flattish plateau immediately above the fall. In fact, it is growing in every spot where this cave water reaches it. The whole rock is encrusted with a thick coat of carbonate of lime, and

the cave is a beautiful illustration of cave formation. When a freshet or rain storm is in progress in the far-off mountains this stream is sure to be affected. Residents say that the water comes out with such force sometimes that one can hear it for miles. This then to me is the secret of the whole thing. The mountain has been burst asunder by the continued force of water. The *Adiantum Capillus-Veneris* has certainly an affinity for this geological formation. The carbonate of lime and the water is its very life. There it grows, in its own selected home, as it never grew before ; and it is to be hoped no hand of vandalism will ever destroy it. This scene is now a perfect gem of Nature's handiwork, in every sense.

I impressed Major Wallace, a gentleman who has some influence in this quarter, with the importance of having this spot protected. Next year there will be a great rush of visitors to this place, and, without some restriction, they will soon uproot every frond. The fern is found plentiful about two miles further up the river ; and those desiring specimens can get them there. I may state I found this fern only in places surrounded by such conditions as have already been mentioned.

Louisville, Ky., Aug. 18. JOHN WILLIAMSON.

§ 73. **Asplenium ebenoides,** R. R. Scott, in **New York State.**—I send, herewith, a frond of *Asplenium ebenoides*, R. R. Scott, which I found yesterday (Aug. 6th), on limestone rocks about four miles S. E. of Poughkeepsie. There were but three plants, and I secured but three fronds. I will give the locality a more thorough looking over, later on, and hope to find some more. *Asplenium ebeneum*, Ait., and *Camptosorus* were, as usually the case, growing with it—all three within a space of about a foot square. In these plants the veins anastomose quite frequently—about 24 times in the frond that I have. Prof. Eaton describes the venation in his specimens as everywhere free. I have never seen this fern mentioned as having been found in New York before; but, whether it has, or has not been, it certainly is very scarce, and worthy of being recorded in the BULLETIN.

Poughkeepsie, N. Y. CLARENCE LOWN.

§ 74. **Fendler's Trinidad Ferns.**—The sets of the second, or supplementary distribution, of this fine collection are now at Prof. Eaton's Herbarium. Several sets (including the first distribution) are still unsold.

§ 75. **Dr. Garber's Porto Rico Plants** are also for sale by Prof. Eaton. The sets run from 96 to 17 species, and are mostly interesting plants. That most delicate of all ferns, *Trichomanes trichoideum*, is in all the sets.

§ 76. **Notes from Syracuse.**—*Plantago media*, L., has been found in the streets. It resembles *P. major*, but has soft downy leaves, and shorter petioles which are not grooved ; the spikes of flowers are shorter, but the stamens are longer and brilliantly colored. Muhlenberg found it in Pennsylvania (Cat. 1813), but Dr. Gray says it is

not known there in our days.—Mr. L. M. Underwood has found *Zygadenus glaucus*, Nutt., growing in considerable abundance in "Tamarack Swamp," two miles east of Syracuse. He would be glad to furnish specimens of this rare plant in exchange for *Orchidaceae*. —The Syracuse Club has gathered *Epipactis* again this year.

§ 77. **Notes from California.**—As in my occasional botanizing, I sometimes am able to make an observation new and interesting to myself, and, so far as I can learn, not yet recorded, I accept your general invitation to "communicate," and send you the following items:

Double Flowers: While botanizing at Whitewater, Wis., in the spring of 1876, I found quite frequent specimens of *Thalictrum anemonoides* and *Hepatica acutiloba* with double the normal number of sepals; and in some cases, I thought I could detect indications of two circles of floral parts, as if two flowers had a common torus A few weeks ago, while botanizing here, on the mountains, I found a specimen of *Lilium rubescens* on which was one well-defined twin flower, with ten parts to the perianth, twelve stamens, and *two pistils*, proving beyond doubt the twin character of the blossoms.

Rootstock of Erythronium grandiflorum.—While collecting the above plant on the foot-hills here, I discovered that it has a very delicately attached rootstock.

Lilium Humboldtii.—This plant, which is very abundant along mountain streams here, frequently has one of its upper whorls of leaves lengthened into a very perfect spiral.

Pontederia cordata.—This plant I find growing under cultivation here; the owner says he collected it in this county, but I have not seen it wild. I observe that as the flowers wither, the stems bend downward until the fruiting spike is immersed in the water, where the fruit matures. I observed the same fact concerning it in Wisconsin.

Ricinus communis.—The castor-oil plant, which is an annual herb in the Northern U. S., grows to be a perennial tree twenty feet high in Southern California.

Poison Oak.—The poison oak of California, *Rhus diversiloba* (?) grows very abundantly everywhere on the foot-hills and mountain sides. Though quite as poisonous in its effects upon human beings as *Rhus toxicodendron*, the horses and cattle here eat it with relish and apparently without harm. GEO. R. KLEEBERGER.

Weaverville, Cal., July 27.

§ 78. **Teratological Notes.**

1.—In the Horace Mann herbarium at Cornell University is a specimen of *Botrychium lunarioides* which, besides possessing the usual fruiting stalks, has two of the sterile segments replaced by fertile divisions.

Dichotomous fronds of *Aspidium marginale* have several times been found by me at Ithaca.

In 1879 I collected a "twin frond" of *Polypodium incanum* in Alabama. The stipe branched near the middle.

Supernumerary carpels were frequently observed on *Acer Pseudo-Platanus* at Ithaca, the number of wings sometimes reaching five.

Last spring I found a regular, spurless flower of *Viola cucullata* with revolute petals; and flowers of *V. rostrata* with several spurs were several times found. WM. TRELEASE.

2.—Adventitious leaves on *Rhus glabra*, L., are of common occurrence hereabouts, and this season more than usual; also occasionally on *Rhus copallina*, L. I have not observed them on any other species.*

Anthoxanthum odoratum, L. is common with adventitious leaves in summer.

Many plants have made a remarkable variation in their second, or last growth, such as twin and branching or forking stems, etc. A plant of *Corallorhiza odontorhiza*, Nutt., threw up three scapes from one root. But the most remarkable behavior is the change in the flowers of *Gratiola aurea*, Muhl., some being very double, others having one flower set in another like a *Primula*. In some cases one or two buds would grow out of a flower. I enclose a few specimens I have at hand, not the most double. Thousands of them are found on the edge of a pond. ERASTUS S. WHEELER.

Berlin, Mass.

*[Mrs. Rust, of Syracuse, sends specimens of *Rhus typhina*, L., in which the flowers are replaced by leaves. EDS.]

3.—*Monstrous Fuchsia*.—We have received from Mr. James H. Cook, of Strathroy, Canada, a fresh specimen, accompanied by an excellent pencil sketch of a monstrous *Fuchsia*, which shows the following changes: From the side of the ovary, near its base, there proceeds a perfect leaf; the ovary is normal, but the calyx limb is five-lobed, and there are but two petals. The stamens are eight in number; one of them confluent with the margin of a petal, and another having a decidedly petaloid anther. The flattened pistil is coherent with the inner surface of the calyx tube throughout the whole length of the latter, and its exposed portion is provided with a narrow, finely-serrated lamina which extends as far as the five stigmas.

§ 79. **Pine Barren Plants in Rhode Island.**—I was much interested in Mr. Britton's article in the July number, on the Northward Extension of the New Jersey Pine Barrens Flora. We have a little piece of that peculiar region in Southern Rhode Island. In his list I check the following as certainly occurring with us: *Hudsonia ericoides*, L., very abundant; *Tephrosia Virginiana*, Pers., frequent; *Aster nemoralis*, Ait.; **A. concolor*, L; *Chrysopsis falcata*, Ell., abundant; *Gaylussacia dumosa*, T. & Gr.; *Kalmia angustifolia*, L.; *Asclepias obtusifolia*, Michx.; *Spiranthes simplex*, Gray; *Xyris flexuosa*, Muhl.; *X. Caroliniana*, Walt.; *Glyceria obtusa*, Trin.; *Coreopsis rosea*, Nutt., this year superabundant; *Eupatorium hyssopifolium*, L.; *Aster spectabilis*, Ait.; *Solidago puberula*, Nutt.; *Cupressus thyoides*, L.; *Sporobolus serotinus*, Gray; and *Lycopodium inundatum*, L. I could add many peculiar southern forms, like *Lachnanthes*, long ago found by Dr. Thurber and my father at Worden's Pond. I commend that locality, which is

* *Aster Herveyi*, A. Gray, it will be remembered was also found within our limits last year by Prof. Sargent. W. W. B.

easily reached from Narragansett Pier or Watch Hill, to all collectors who come to the Plantations. W. W. BAILEY.

Providence, R. I., Sept. 10, 1880.

§ 80. **Botanical News.**—The *Botanisches Centralblatt* is the title of a new weekly journal published under the editorship of Dr. O. Uhlworm, of Leipzig. The object of the publication is to supply brief abstracts in each issue of every important new independent paper in a scientific journal, in all branches of botanical science; a complete index to titles of recent botanical literature in all countries; brief original communications; reports of museums, gardens, botanical explorations, etc.; personal news, etc. Dr. Uhlworm has secured the co-operation of correspondents in the various towns of Germany, France, England, Switzerland, Sweden, Denmark, Greece, Russia, Holland, etc., and invites the further assistance of botanists in all countries to render the *Centralblatt* as complete and useful as possible. The Editor's address is Südstrasse, 82, Leipzig.

Trimen's *Journal of Botany* for July contains: Enumeratio Acanthacearum Herbarii Welwitschiani Angolensis, by S. LeM. Moore; Cardamine pratensis and its Segregates, by G. Nicholson; On Lattakia Tobacco, by W. T. Thiselton Dyer; Botany of the British Polar Expedition, by H. C. Hart; and On a Collection of Ferns made by Dr. Beccari in Sumatra, by J. G. Baker.

In the *Botanical Gazette* for July, Mr. Meehan discusses the vitality of pine seeds; Dr. Gray calls attention to the proterandry of *Eremurus robustus;* Prof W. W. Bailey records a case of albinism in *Arethusa bulbosa;* Mr. L. H. Bailey gives a short list of Michigan Lake shore-plants; and another writer notes the occurence of six fungi on *Anemone nemorosa*. The Editor of the *Gazette* announces his intention of closing his sanctum for two months, and of partaking of a luxury seldom accorded to journalists—that of a vacation.

Origin of Flowers through Insect Selection.—Not long since, Dr. Herman Müller, it will be remembered, published a work in which he endeavors to explain the existing variations in the forms of flowers on the principle of "selection." His supposition is that insects of different tastes breed peculiar flowers just as men breed peculiar races of cattle. Carrion-loving insects breed their kind of flowers; long-tongued insects the tubular kinds; and many other classes of insects have each bred the flowers they love best. Dr. Müller has a note in *Nature* of July 8th, in which he points out that the European *Saxifraga umbrosa* has been adorned with its present brilliant colors through selection by dipterous insects of the family Syrphidae. He says:

"Among Diptera the most assiduous visitors of flowers are certain Syrphidae, which, elegantly colored themselves, are fond of splendid flower-colors, and, before eating pollen or sucking nectar, like to stop awhile, hovering free in the air, in front of their favorites, apparently fascinated, or at least delighted, by the brilliancy of their colors. Thus I repeatedly observed *Syrphus balteatus* hovering before the flowers of *Verbascum nigrum*, and often before *Melanostoma mellina; Ascia podagrica* before *Veronica chamaedrys;* and in

the Alps the lank *Sphegina clunipes* before *Saxifraga rotundifolia* and in my garden *Ascia podagrica* before *Saxifraga umbrosa*.

Of *Verbascum nigrum* the main fertilizers are humble-bees, Diptera co-operating only in a subordinate degree; in the case of the three other species, on the contrary, the above-named Syrphidae are such frequent visitors and cross-fertilizers that we may safely conclude that it is by their selection of elegantly-colored varieties that these flowers have acquired their beautiful peculiarity. Hence, in order to estimate the color-sense of these Syrphidae, it is worth while to consider what color-combinations they have been able to produce by their selection.

Saxifraga umbrosa being, as far as hitherto known, their finest masterpiece, we may in the first place look at the variegated decoration of this species. Its snow-white petals are adorned with colored spots, which in size and intensity of light gradually decrease from the base of the petals towards their extremity. Indeed, nearest to their base, within the first third of their length, there is a large irregular spot of an intense yellow ; about the middle of their length there follows a narrower cross band of red color, vermilion towards the base, intensely pink towards the outside, not reaching the margins of the petals, sometimes dissolved into several separate spots ; lastly, beyond the middle of the length of the petals there are three to eight smaller roundish spots of a paler violet-pink color.

The flowers of *Veronica chamaedrys* prove that also gay blue colors are perceived and selected by Ascia.

On some Impurities of Drinking-Water.—Under this title, Prof. W. G. Farlow has recently sent us a pamphlet recording the results of his investigations, extending over several years, as to the causes of the " pig-pen " odor which occasionally makes its appearance in water stored up for the use of cities. The subject is discussed in a popular form, and from strictly a botanical point of view. Prof. Farlow has traced the cause of the odor in question to the putrefaction of algae belonging to the order *Phycochromaceae*. This order contains certain genera, three at least of which have been found in decay to cause disagreeable conditions of drinking-water; these genera being *Clathrocystis*, *Caelosphaerium* and *Anabaena*. So far as known, the so-called " cucumber taste," which also sometimes makes its appearance in drinking-water, is not due to the growth or decay of any species of plant; nor can any cause—botanical, zoölogical, or chemical be assigned for it. A perusal of Prof. Farlow's paper will serve to allay the fear of those who see in every minute alga floating in water the germs of disease.

The August number of the *Phrenological Journal*, received July 20th, contains a portrait of the late Charles C. Frost, accompanied by a biographical sketch from materials furnished by Rev. Lucius Holmes.

To the *American Monthly Microscophical Journal* Dr. Wolle contributes another note on fresh-water algae ; the subject treated is the genus *Bulbochaete*, and figures of six species illustrate the text.

§ 81. **Erratum.**—In Mr. Ellis's description of a new *Sphaeria*, p. 90, 6 lines from the bottom of the page, strike out the comma after the word "*sporidias.*" Although Mr. Ellis's communication is dated May 26th, it was not received by us till the latter part of July.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII. New York, October, 1880. **[No. 10.**

§ 82. **Proceedings of the Torrey Club.**—The regular meeting of the Club was held at the New York College of Pharmacy, Tuesday evening, Sept. 14th. In the absence of the presiding officers, Dr. T. F. Allen occupied the chair. There were sixteen members and three visitors in attendance.

Plants Exhibited.—Mr. Wright exhibited a number of dried plants from Mt. Riga, Conn., and distributed, on behalf of the sender (Mr. Wm. Chorlton), some specimens of exotic flowering plants and ferns. Mr. Britton distributed seeds of *Megarrhiza Californica* and *Nelumbium luteum*, Willd., and exhibited specimens of *Phoradendron flavescens*, Nutt., taken from *Nyssa* in the pine barrens of New Jersey. Mr. Brown showed a large number of specimens of adventive plants from Communipaw. Specimens of *Spiranthes simplex*, Gray, from Woodlawn Cemetery, and of *Silphium perfoliatum*, L., from Fort Washington, were shown by Mr. Bicknell. Mr. Le Roy stated that the last mentioned plant was introduced into the upper portion of New York Island many years ago by a gentleman who sowed the seeds broadcast in several localities. Mr. Gerard brought specimens of *Opuntia vulgaris*, L., from the King's Bridge Road (directly west of High Bridge), and of *O. Rafinesquii*, Englm., from Fort Washington, and pointed out the difference between the two species, which are often confounded. Prof. Martin exhibited and remarked upon specimens of carnauba wax—the product of the leaves of *Copernicia cerifera*, a Brazilian palm. Prof. Martin stated that his specimen was portion of a cargo of this product recently brought to New York, but which had met with no sale, the impossibility of bleaching it rendering it unfit for many purposes in the arts and industries.

Teratology.—Dr. Kunze brought for the Club's inspection a living specimen of *Cereus*, which had been received by him from Venezuela, and in which the upper joints were greatly deformed and closely coherent, forming a compact, nearly globular mass. The changed appearance of the plant was so great as to render identification of the species impossible. Mr. Wright exhibited a specimen of *Setaria viridis*, Beauv., showing fission of the axis and a consequent formation of two well-developed spikes at the apex of the same culm. Mr. Bicknell showed a fruit of *Quercus Prinus*, L., the cupule of which contained a supernumerary, although compressed and sterile acorn.

Large Trees.—Mr. Britton stated that during his recent exploration of the pine barrens while in the employ of the N. J. Geological Survey, he observed in Manahawken Swamp, Ocean Co., a *Magnolia glauca*, the trunk of which was 32.25 inches in circumference. This tree when felled was found, on counting the rings, to be about 150 years old. In the same swamp was found an *Ilex opaca* of unknown age, with a trunk 36 inches in circumference. Mr. Britton had seen

in the museum of Rutger's College a section of the trunk of *Liriodendron* having a circumference of 21 feet. The specimen was obtained at Marlborough, N. J.

Vitality of Gourd Seeds.—A remarkable case of duration of vitality in the seeds of a cucurbit was mentioned by Mr. Le Roy. In the Torrey collection there is a specimen of a gourd which was obtained between the years 1838 and 1842, in Patagonia, by the Wilkes Exploring Expedition. Finding three seeds still remaining in the specimen, Mr. Leroy planted them in his garden. Two of the seeds germinated, and the plants are now in fruit. For want of the necessary figures and descriptions, the species has not yet been identified.

Dr. T. F. Allen read a paper on the "Similarity between the *Characeae* of America and those of Asia."

§ 83. **Polyporus volvatus,** Peck, **and its Varieties.**—Since the publication of the description of this fungus in the Twenty-seventh New York State Museum Report, other forms of the species have come to my knowledge, and other observations have been made which render some additional notice of it desirable, since it presents two characters which may perhaps be deemed of more than mere specific value. The most conspicuous one is the remarkable prolongation of the margin of the pileus. This extends beyond and beneath the mouths of the pores like a thick coriaceous veil, and either wholly or partly conceals them from view. In two of the varieties* the veil opens below by a well defined circular or subelliptical aperture, usually about one-fourth of an inch in diameter. Through this aperture the spores have a way of escape, although it is so much smaller than the hymenial surface that it is not unusual to find little heaps or even masses of spores retained within the veil. These heaps of spores are generally permeated by minute filaments which apparently aid in holding the spores together. The aperture is not exactly in the centre of the veil, but nearer the posterior than the anterior surface of the fungus. The veil is a little thicker just anterior to the aperture than it is elsewhere. The thin epidermis generally disappears from the veil, so that in mature specimens this part is often a little paler than the rest. If this is cut away the remaining part of the pileus is nearly hemispherical. The hymenophore or non-porous part of the pileus, in fresh specimens, is separable into two parts. The exterior, which, by its continuation beyond the mouths of the pores, forms the veil, may be torn away from the thin interior part which lies next to and is intimately connected with the pores, very much as the rind of an orange may be peeled from the pulp. The thin interior stratum is also slightly prolonged beyond the mouths of the pores and its prolongation forms a kind of prominent margin to the hymenial surface. The other character is found at the mouths of the pores. Not only are the dissepiments here differently colored, but they are also decidedly and permanently thicker than they are elsewhere, thus making the diameter of the pore much

* In the variety *Torreyi* no aperture has yet been seen, but one probably exists in fully and properly developed specimens.

less at the mouth than it is a little distance above. The hymenial surface appears very much as if it had been thinly overspread by some colored, yielding but inelastic substance, and then punctured by the point of a pin just over each pore. The prominence of the interspaces causes the pores to appear as if in little depressions. Are the characters now noticed of generic value? Possibly some may so regard them; and, certainly, genera of fungi have been constituted upon far less obvious characters than these; but until other species are known which shall give emphasis to the importance of these characters it seems best to me to consider them merely sectional or at most subgeneric. Without them the species would naturally fall in the Suberose section of the *Placodermei*. In this section is the birch *Polyporus*, (*P. betulinus*,) a species in which also the margin of the pileus extends beyond the mouths of the pores, but to a far less extent. It never even partially conceals them from view. In this species also, the pores and a very thin layer of the hymenophore to which they are attached are separable in the fresh plant from the main part of the pileus. Thus it makes an approach to the aberrant characters of *P. volvatus*; slight, indeed, but sufficient to indicate the relationship of the latter to more typical *Polypori* and to cast a doubt upon the generic value of the characters indicated. That the mouths of the pores should present a color unlike the rest might not, of itself, be considered a very important or novel feature, but the permanent thickening of the dissepiments at this place and the consequent diminution here of the diameter of the pores is a character not clearly shown by any other *Polyporus* known to me. It may, therefore, be well to make at least another section of the *Placodermei* for the reception of this fungus.

The typical form of the species has been found on dead trunks of the black spruce, *Abies nigra*. It occurs on these plentifully in some parts of the Adirondack forests of New York, where it follows the devastating track of the spruce-destroying beetle. Dozens of specimens may be found on the trunk of a single tree, and generally each specimen covers a perforation previously made in the bark of the tree by the attacking beetle. The mycelium grows beneath the bark and the perforations afford a convenient passage-way to the external air where the fungus is developed. Any crevice in the bark, however, will answer the same purpose, so that the fungus is not dependent on the perforations of the beetle for its full development and the continuance of its species. The average size of the specimens is from one-half to three-fourths of an inch in diameter. Rarely do they exceed one inch in diameter. The color of the mouths of the pores is a pale cinnamon-brown.

A second form has been collected in California by H. W. Harkness, M.D., who finds it on the twisted pine, *Pinus contorta*, and on one or two other coniferous trees. A single specimen was once found by the writer. It grew on pitch pine, *Pinus rigida*, near Albany, New York. This form is generally larger than the other, its average diameter being about one inch. The mouths of the pores are also generally darker colored. Specimens of it were sent to England and there received the name *Polyporus obvolutus* Berk. and Cke., (*Grev-*

illea, Vol. vii. p. 1.) but no description was published with the name. It can not well be considered a distinct species, as the differences between it and the other form are only those of size and color. Specimens of it have been distributed by Mr. J. B. Ellis in Century IV, North American Fungi. A third and more distinct form comes also from California. For my information concerning it I am indebted to Mr. W. R. Gerard who informs me that the herbarium of the late Dr. Torrey contained three specimens (all that are known) which bore the record—"In Sandy Desert, California." All had a distinct

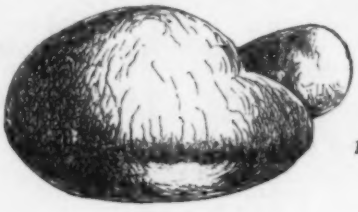


Fig. 1.

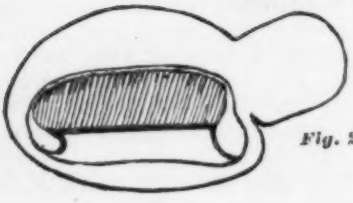


Fig. 2.

Fig. 3.

lateral stem, as shown in the annexed figure, and, in all, the veil-like prolongation of the margin of the pileus was entirely closed. Nevertheless the spores were well developed and the mouths of the pores had the dark-brown color that exists in the other Californian specimens. No record was found concerning the matrix on which the specimens grew, but Mr. Gerard suggests that it was probably some small twig, judging from the appearance of the base of the stem. The size of the pileus was about the same as in the other Californian specimens.

The following is a brief characterization of the section, species and varieties of this fungus.

CRYPTOPORUS.

(A section of *Placodermei.*) Pileus at first subcarnose, becoming harder or corky, sessile or stipitate, the margin greatly prolonged beyond and beneath the mouths of the pores and wholly or partly concealing them from view, generally opening beneath by a small aperture; pores not stratose, the dissepiments thickened at the mouths and there differently colored.

The only species yet known is

POLYPORUS VOLVATUS, Peck.

Pileus globose or subglobose, sessile or rarely stipitate, even,

glabrous, azonate, whitish, often somewhat tinged with yellowish or reddish-brown; pores equal to or longer than the thickness of the hymenophore, the mouths punctiform, light cinnamon-brown or dark-brown; spores pale, with a flesh-colored tint, .00035–.0005 of an inch long, about .0002 of an inch broad.

Var. *typicus*. Smaller, 6–9 lines in diameter, sessile, mouths of the pores light cinnamon-brown. On *Abies nigra*. New York.

Var. *obvolutus*. (*Polyporus obvolutus*, Berk. & Cke.) Larger, 10–15 lines in diameter, sessile, mouths of the pores usually dark-brown. On *Pinus contorta*, etc., California. On *Pinus rigida*. New York.

Var. *Torreyi*, Gerard, *Ms.* Larger, 10–15 lines in diameter, stipitate, mouths of the pores dark-brown. California, (*Legit* John Torrey, M.D.)

CHARLES H. PECK.

EXPLANATION OF THE FIGURES.—Fig. 1, the stipitate variety *Torreyi*, of *Polyporus volvatus*, Pk., natural size. Fig. 2, vertical section of the same. Fig. 3, spores x 1000, seen in three positions.

§ 84. **Sexuality of Croton monanthogynum.**—In 1878 I collected a few seeds of *Croton monanthogynum*, which were sown in the spring of 1879. These germinated in the spring of 1880, and are now in flower. There are four plants. Two are wholly pistillate, and two wholly staminate. So far as these four plants go, it would seem that the species is dioecious and not monoecious as described in our references.

It is interesting to note that these male plants are not half the size of the females, and this accords with similar facts in hemp, spinage and others; and with the general views explained in my Salem and Troy papers (American Association for the Advancement of Science) that a greater vital (nutritive) power is associated with the production of female than of male flowers. It is not always, however, that the lower power of nutrition is evidenced throughout the whole plant as illustrated in these instances. Often it is only on the weaker branches of the same plant that the male flowers are borne—the ones the most highly vitalized resulting in female flowers.

THOMAS MEEHAN.

§ 85. **Similarity between the Characeae of America and Asia.**—Prof. Asa Gray has well shown the similarity of the floras of the eastern parts of the two great continents in relation to other groups of plants, and I now propose to show that this resemblance extends to the *Characeae*, although as yet our acquaintance with the forms of this order, both Asiatic and American, is comparatively slight.

My knowledge of Eastern *Characeae* is obtained wholly from some articles by the late Prof. A. Braun, in *Linnaea*, Vol. 17, Ser. i. *Charae Preissianae*, and in Vol. 1 of *Hooker's Journ. of Botany*, 1847, *Characeae Indiae Orientalis etinsularum Maris Pacifici*. The former article treats of the Australian species; the latter of those of India, Ceylon, the Sunda, Mariana and Sandwich Islands, and is of the greater interest to us. In his preface Prof. Braun says: "It is remarkable

that several of the East Indian species agree with those of South America and the warmer parts of North America."

The first species to which I desire to call attention is

NITELLA POLYGLOCHIN, A. Br.—This name was proposed by the late Prof. Braun in his *Characeae* of Africa, to include *N. Roxburghii*, A. Br., *Hooker's Journ.*, 1, 292, *Chara furcata*, Roxb., *C. soluta* and *Lysimocepas Voigtii*, Griffith's posth. papers. It is the type of a series of forms which belong to the *Diarthrae-monoicae* division of the genus *Nitella*. The species of this large division possess two-celled terminals and are divided into two series—the *Mucronata* with single tips and the *Polyglochin* with multiple tips, (the Greek words from which it is derived signifying many points). *Nitella Roxburghii*, of the coast of Coromandel near Madras, answers perfectly to the specimens that I have found in this country. The plant is not known in Europe, neither is there any representative there of this *Polyglochin* series. Nothing can exceed the superb beauty of masses of this *Nitella* as brought up from deep water in Litchfield Lake, Conn., where it grows along with the roots of *Marsilia quadrifolia*, L. The antheridia are not red as in most *Characeae* but a very delicate green, with a shade of old gold; and one afternoon when I captured a mass half the size of my boat while the setting sun shone across it as it lay just beneath the surface, my enthusiasm was unbounded. It there grows from two to four or, I believe, even six feet in length. I have also gathered it in New Jersey, and have received it from the West and from Boxford, Mass., by the kindness of Mr. John Robinson, of Salem. Twenty years ago, when I sent the small-fruited variety to Prof. Braun, it was then considered distinct (*N. microcarpa* A. Br., *Characeae* of Central America). These two forms of the *Polyglochin* series differ from other allied species by their *clustered fruit;* I often find four or five sporangia in one verticil, reminding me of the *Tolypellae*. They seem to be widely distributed over the American continent.

CHARA HYDROPITYS, Reichenb. This species belongs to the *Haplostephanae*, *Bistipulatae*, *Diplostichae Monoicae* division of the genus *Chara*. The name was first bestowed on specimens from Surinam. In 1830 Salzmann gave the name *C. longibracteata* to some specimens from Brazil, and Prof. Braun in his *Characeae* of Central America gives Dutch Guiana, Brazil, Mexico, the South-Sea Islands, VanDieman's Land, Australia, Southern Africa, and the East Indies as habitats for it. In *Hooker's Journ.*, 1, 297, 1847, it is reported from the coast of Coromandel, Assam, and Busna in India. It is a beautiful microscopic object; the leaves are either entirely naked or have two or three corticated nodes. The finest specimens are found in New Jersey, where it is abundant (Panther Pond, Sussex Co., and Morris Pond, Sparta). I have also gathered it in Apponaug Pond, Rhode Island. I have received the naked-leaved form (*Chara Chamaepitys*, A. Br.) or a variety nearly allied to it, from Florida (Curtiss). It is thus apparent that the species is widely diffused in this country; but no plant of this division is known in Europe. I have also a dioecious *Chara* of the same section, either a variety of *C. Dichopitys* or a closely allied new species, which was sent me by Mr. Curtiss from Key West. The fruit is much larger than in *C. Hook-*

eri, A. Br., and *C. Preissii*, A. Br., (both of which Prof. Braun includes under C. *Dichopitys*), and more closely approaches that of *C. Ecklonii* from Africa. Should this prove distinct, I propose to name it *C. Curtissii*.

All of these *Charae* are always gymnopodous, that is the first internode of the leaf is naked. The variations in the cortication of the other internodes are great; this naked internode is usually quite as long as any of the others, thus differing from the *Gymnopodae* of the *Diplostephanae* section. The development of the stipules serves to distinguish one from the other; besides, the stem cortication of the latter plants is *triplostichous* while that of the former is *diplostichous*.

These *Gymnopodae* of the *Diplostephanae* section of the genus *Chara* are also peculiar to America as compared with Europe, and common to America and Asia. Not a single species is known in Europe; while in America, North and South, the islands of the Pacific, Asia and Africa, there are numerous species and varieties. In the United States we find *C. sejuncta*, A. Br., two varieties; *C. gymnopus* var. *elegans*, A. Br.; var. *Humboldtii*, A. Br.; var. *trichacantha*, A. Br.; var. *Michauxii*, A. Br.; var. *conjugens*, A. Br. In the Sandwich Islands, var. *Meyenii*. In India, var. *Ceylonica*. In Africa, var. *Delilei*. In some of the West India Islands, var. *Berteroi*, besides the following allied species: *C. Javanica*, A. Br., *C. inconstans*, A. Br. Central America; *C. Crügeriana* A. Br., Trinidad; *C. Angolensis*, A. Br., and *C. Commersonii*, A. Br., Africa. It is interesting to note that this species, with its sub-species and varieties, is widely known except in Europe.

For the determination of other forms we find ourselves obliged to consult the East.

T. F. Allen.

§ 86. **Large Trees near New York City.**—The following trees of considerable size were measured during the month of July. The circumferences are nothing extraordinary for the respective species in their most favored localities, but are perhaps as great as any to be found in this neighborhood. In the town of Bayonne, Hudson Co., N. J., on the New Bergen Road, just south of the M. & E. Canal bridge, there is a remarkable group of *Castanea vesca*, L., var. *Americana*, Michx., one 16 feet, two over 12 feet, and seven over 10 feet in circumference at 5 feet from the ground. They have been almost entirely deprived of their bark, and all are dead or dying; but the trunks show no signs of decay.

Populus monilifera, Ait. A beautiful tree, 14 feet in circumference, measured at 5 feet from the ground, adorns the lawn of Philip S. Crook, Jr., at the corner of Flatbush and Caton Avenues, in the village of Flatbush, Kings Co., N. Y. Some years since it was struck by lightning, but shows little sign of injury. The owner, being a gentleman of taste, saved the tree by the application of a great metal band around the base of the lower limbs.

Juglans nigra, L. A specimen 12 feet in circumference, on Mr. Crook's lawn, makes a worthy fellow of the *Populus*. In the forks of its branches, at 20 feet from the ground, there has sprung up a bush of *Ribes rubrum*.

Quercus alba, L. In a wood on the south side of the Astoria and Flushing Road, near the school house, a quarter of a mile east of the Trains' Meadow Road, in the town of Newtown, Queens Co., N. Y., the following trees were measured: two of 9 feet each in circumference, at 5 feet from the ground; one of 11 feet 9 inches; one of 9 feet 7 inches; one of 12 feet 3 inches; one of 10 feet 6 inches; and one of 13 feet; the last with a spread of 85 feet. The wood of which the above forms a part has recently had much timber cut in it, and there is little doubt that these fine trees will soon fall before the axe.

Liriodendron Tulipifera, L. A few trees from 10 to 12 feet in circumference still remain on Bergen Neck, near the M. & E. Canal. Before the establishment of a saw mill on the side of the canal, there was a great variety of splendid forest trees in the Pamrapo woods.

Platanus occidentalis, L. This seems to have been a favorite shade tree in the olden time. In Brooklyn the course of the primitive country roads, long since closed, may be traced by their frequent occurrence, often in pairs, as they stood in front of the farm houses. A pair in front of 121, McDonough Street, measure respectively 14 feet, and 14 feet 8 inches in circumference. Another pair still flourish on the Jamaica plank road, in New Brooklyn. They are 10 and 11 feet in circumference. A single tree in front of 684, Atlantic Avenue, measures 11 feet.

The almost entire absence of large forest trees, which is very noticeable on Long Island, is accounted for by Stiles, in his History of the City of Brooklyn, (Vol. 1, page 310), as follows: "In the fall of every year the Long Island counties would be assessed for many thousand cords of wood, to be cut down and delivered at certain points for the use of the British garrisons in New York and vicinity. In this manner both Queens and Kings Counties were utterly despoiled of the abundant forests which had been their pride; and when the British finally left the island, scarcely a stick, except a small piece of oak woods a few miles beyond Jamaica, which belonged to a strong Tory, had escaped the axe. All the woodlands now in these counties have grown since the year 1783."

Either the above statement is too broad, or the locality "beyond Jamaica" is a mistake. The Newtown oaks mentioned above are certainly older than 1783. The oaks of the same species in Flushing, under which George Fox preached in 1672, and which were then presumably large trees, when measured by Messrs. Bruce and G. Furman 153 years afterwards, were but 13 feet and 12 feet 4 inches in circumference, or about the size of the two largest Newtown oaks. (Furman's Antiq. of L. I., 1875, page 97).

The annals of Newtown and of Queens Co. fail to throw any light on the exact locality of the oak woods, which Dr. Stiles states were spared during the Revolution.

Brooklyn, July 30, 1880. W. H. RUDKIN.

§ 87. **Contributions toward a List of the State and Local Floras of the United States.**—It is proposed in this and subsequent numbers of the BULLETIN to enumerate, as far as known to us, all the

State and local floras that have thus far been published. Large numbers of short lists of plants of various localities have appeared from time to time in the BULLETIN, the *Botanical Gazette*, and in numerous scientific publications not devoted especially to botany; but only the more important and longer lists from such sources are referred to in the following catalogue. As the subject covers a wide field we cannot hope, unaided, to elaborate it perfectly; and it will doubtless be found that we have overlooked many publications of importance. We would esteem it a favor, therefore, if those who notice such omissions would kindly call our attention to them, in order that the omitted titles may be published as an appendix and the record thereby be eventually rendered as complete as possible. In the following catalogue, bare lists of plants without stations are denoted by "(A)"; those with stations, by "(B)"; those with stations and occasional descriptions of new or old species, by "(C)"; and those floras, in which a description, popular or scientific, is given of every plant enumerated, by "(D.)" Where these bracketed letters are omitted, the title of the flora has been obtained by us at second hand, and we have had no opportunity of verifying it.

W. R. G.
N. L. B.

I.—THE EASTERN STATES.

An account of some of the vegetable productions growing in this part of America, botanically arranged. By Rev. M. Cutler. (D.)
In Mem. Amer. Acad. Arts & Sci. Vol. i. Boston, 1785.

Enumeration of some New England Lichens. By Edward Tuckerman. (D.)
In Jour. Bost. Soc. Nat. Hist. Vols. ii, iii and v, 1838–1847.

Contributions to New England Mycology. By Chas. J. Sprague. (B.)
In Proc. Bost. Soc. Nat. Hist. Vols. v and vii, 1856 and 1858.

Further enumeration of New England Fungi. By Chas. C. Frost. (A.)
In Proc. Bost. Soc. Nat. Hist. Vol. xii, 1868.

Notice of some rare Plants of New England, with descriptions of some new species. By Wm. Oakes. (C.)
From Hovey's Mag. Horticult. 8vo. pamph. pp. 8. Boston, 1841.

Notice of some of the Plants of New England. By Wm. Oakes (B.)
In Hovey's Mag. Horticult. Vol. xiii. Boston, 1847.

MAINE.

A Catalogue of the flowering Plants of Maine. (Includes vascular Cryptogams.) By George L. Goodale. (B.)
In Proc. Portland Soc. Nat. Hist. Vol. i. Portland, 1862.

Decades of Maine Fungi. By M. C. Cooke. (D.)
In Proc. Portland Soc. Nat. Hist. Vol. i. Portland, 1862.

The Portland Catalogue of Maine Plants. (A.)
Pub. by Port. Soc. Nat. Hist., 8vo. pamph. pp. 12. Portland, 1868.

NEW HAMPSHIRE.

Catalogue of the Plants of New Hampshire. By Wm. F. Flint. (A.)
In Geol. N. Hamp. Vol. i. Concord, 1874.

List of the Plants found in New Hampshire only on Alpine Summits. (A.) (Ibidem.)

Canadian Plants naturalized on Mt. Washington. (A.) (Ibidem.)
Catalogue of the Alpine and Sub-Alpine Flora of the White Mountains of N. H. By Prof. J. W. Chickering. (A.)
In "Field and Forest." Vol. ii. Washington, 1876.
List of Plants collected by E. W. Southwick on the White Mountains of New Hampshire, July 15, 1841, with notes and references. By J. Barratt. M. D. (B.)
From the "Classic." 8vo, pamph. pp. 11.

VERMONT.

Catalogue of Vermont Plants. By Wm. Oakes. (B.)
In Thompson's Nat. Hist. Vt. Burlington, 1842.
Appendix to Oakes' Catalogue of Vermont Plants. By Joseph Torrey. Ibidem. Ed. 1853.
Catalogue of Vermont Plants: Phaenogams by Geo. H. Perkins; Cryptogams, by Chas. C. Frost. (B.)
In Archives of Science. Vol. i. McIndoes Falls, 1872.
List of Vermont Equisetaceae and Filices. By Chas. C. Frost.
In Trans. Orleans Co. Soc. Nat. Hist. Vol. i, Newport, 1871.
Catalogue of the Plants of Middlebury. By Edwin James.
In Hall's Statist. Acc't. of Town of Middlebury, 1821.

MASSACHUSETTS.

Catalogue of the Plants growing without cultivation in the vicinity of Amherst College. By Edward Hitchcock. (B.)
8 vo. pamph. pp. 64. Amherst, 1829.
Catalogue of the Plants growing without cultivation in the State of Massachusetts. By Edward Hitchcock. (B.)
In Rep. on Geol., etc., of Mass. Amherst, 1833.
Massachusetts Catalogue of Plants. By Edward Hitchcock. (B.)
8 vo. pamph. pp. 54. Amherst, 1835.
Report on the herbaceous Plants of Massachusetts. By Chester Dewey. (D.)
In Zool. and Botan. Survey Mass. 8vo. pp. 278. Boston, 1839.
Report on the Trees and Shrubs growing naturally in the forests of Massachusetts. By Geo. B. Emerson. (D.) Boston, 1850.
Musci of Eastern Massachusetts. By Rev. J. L. Russell. (B.)
In Jour. Bost. Soc. Nat. Hist. Vol. v., 1845.
Catalogue of the Plants growing without cultivation within thirty miles of Amherst College. By Edward Tuckerman and Chas. C. Frost. (B.) 8vo. pamph. pp. 98. Amherst, 1875.

Berkshire County.

*Catalogue of Berkshire County Plants. By Chester Dewey.

Bristol County.

Catalogue of Plants found in New Bedford and its vicinity. By E. W. Hervey. Pamph., 1860.

Dukes County.

Flora of Penikese Island. By D. S. Jordan. (A.)
In Amer. Naturalist, Vol. viii, 1874.

* We have mislaid our reference to this list, and publish the title hoping some reader of the BULLETIN may be able to supply the date and place of publication.

Essex County.

List of Plants collected in Salem and its vicinity, in 1857. By S. B. Buttrick. (A.)

In Proc. Essex Inst. Vol. ii, Salem, 1860.

List of the Ferns of Essex County. By John Robinson. (B.)

In Bull. Essex Inst. Vol. vii, Salem, 1875.

Suffolk County.

Florula Bostoniensis ; a collection of the Plants of Boston and its vicinity. By Jacob Bigelow, M.D. (D.) 8vo., pp. 268. Boston, 1814. (enlarged editions, 1824 and 1840.)

Beautiful Plants growing wild in the vicinity of Boston. By E. B. Kenrick. (D.)

In Gardeners' Mag. Vols. i and ii. Boston 1835–6.

List of Fungi collected in the vicinity of Boston. By D. Murray and Charles J. Sprague. (A.)

In Proc. Bost. Soc. Nat. Hist. Vol. vi, 1856.

List of Fungi found in the vicinity of Boston. By W. G. Farlow, M.D. (A.)

In Bullet. Bussey Inst. Mar. 1876 and Jan., 1878.

RHODE ISLAND.

Catalogue of Rhode Island Plants. By S. T. Olney. (A.)

Published by the Franklin Society. 8vo. pamph. pp. 8. Providence, 1844.

Catalogue of Plants collected by the Botanical Department of the Providence Franklin Society, principally in Rhode Island, in 1844.

Additions to the published lists of the Providence Franklin Society. By S. T. Olney. (B.)

In Proc. Providence Franklin Soc. Vol. i, 1846 and 1847.

CONNECTICUT.

List of the marine Algae growing in Long Island Sound within twenty miles of New Haven. By F. W. Hall. (B.)

In Bullet. Torr. Bot. Club. Vol. vi. New York, 1876.

List of Lichens growing within twenty miles of Yale College. By F. W. Hall. (B.)

In Amer. Naturalist. Vol. xi. 1877.

Catalogue of the flowering Plants and higher Cryptogams growing without cultivation within thirty miles of Yale College. (B.)

Pubd. by the Berzelius Soc. 8vo. pamph. pp. 72. New Haven, 1878.

Litchfield County.

List of Plants growing spontaneously in Litchfield and in its vicinity. By John P. Brace. (B.)

In Silliman's Journal, Vol. iv. 1 ser. 1822.

New Haven County.

Catalogue of the phaenogamous Plants and the Ferns growing without cultivation within five miles of Yale College. By William Tully, M.D. (A.)

From Appendix to Baldwin's Hist. Yale College. 8 vo. pamph. pp. 38. New Haven, 1831.

§ 88. **Publications.**—1. *American Journal of Science*, July—October. There are several valuable notes by Dr. Gray in these numbers. In that for July the action of light on vegetation is discussed briefly in view of the recent investigations of Schübeler, Siemens, Flahault, and Pringsheim. He points out that the familiar case of a bright green embryo

in the seed of radish, violet, maple, etc., is not properly due to the formation of chlorophyll in darkness, for during growth the coverings are to a considerable extent translucent, but the peculiarity is that this chlorophyll remains for a very long while unaltered in darkness. As regards the nutritive value of more light and less heat it is too soon for final conclusions. [See also Gilbert's address on Agricultural Chemistry, *Nature*, Sept. 16, 1880]. In the August and September numbers is a review of De Candolle's Phytography, a volume, Dr. Gray says, which is "a needful supplement to the *Philosophica Botanica* of Linnaeus, and the *Théorie Elémentaire* of the elder De Candolle, the two classical books which the serious botanical student should early and thoroughly master. We believe that if Dr. Gray's notes could be obtained separately they would form a valuable appendix to the original volume, from which it is our intention to publish some extracts soon, on the value of herbaria..

2. *Botanical Contributions*, by Asa Gray, (Proc. Am. Acad. Sci., Vol. XVI.) These contributions consist of four sections. The first, on some *Compositae* gives some of the results reached for the Synoptical Flora of North America, as this portion of that work cannot immediately be published. For those who have to determine specimens, particularly of Western plants, it will prove in the meanwhile indispensable. *Vernonia altissima*, Nutt., is restored; *Coelestina maritima*, T. & G., becomes *Ageratum littorale ; Eupatorium parviflorum*, Ell., becomes *E. ambiguum*, Hook.; *Liatris fruticosa*, Nutt., is placed in a new genus, *Garberia ; Greenella* is also a new genus, with the species *Arizonica*, of S. Arizona. Among *Solidagos* we notice that Chapman's *S. odora* becomes a new species, *S. Chapmanii*. But not to go into particulars, those interested in *Townsendia*, *Erigeron* and *Aster* in particular, must have recourse to these notes. Part second gives six new *Asclepiads;* part third, *Geniostemon*, a new genus of Gentians; part fourth, miscellanies, among which we notice *Sedum Mechani* from Utah, and *Reverchonia*, a new genus of *Euphorbiae* from Texas, allied to *Phyllanthus*.

3. *Systematic Fern-List*, a Classified list of the known Ferns of the the United States, with the geographical range of the species, by Daniel C. Eaton. New Haven, 1880. There are here given 151 species of ferns, including the *Ophioglossaceae*, and also one or two species which came too late for insertion in the Ferns of North America. In a preliminary note it is stated that since Mr. Brandegee has discovered *Cystopteris montana* in Colorado, there remain no ferns known as inhabiting British America which are not also found in the United States. The list is intended as a check-list, and may be obtained from the author at the price of ten cents for single copies, or one dollar for fifteen copies, or will be sent in exchange for good specimens of rare or interesting ferns.

We take this opportunity to congratulate the author and publisher on the completion of the "Ferns of North America," which makes two handsome volumes, with preface, additions and corrections, list of plates, conspectus of scientific arrangement, and index. We understand that Mr. Cassino, if sufficiently encouraged, will make arrangements to publish such additional discoveries as may from time to time occur.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII. New York, November, 1880. **[No. 11**

§ 89. **Proceedings of the Torrey Club.**—The regular meeting of the Club was held at the Herbarium, Columbia College, Tuesday evening, October 12th, the Vice-President in the chair. There were sixteen members and four visitors present.

Plants Exhibited.—Mr. Britton exhibited a section of the trunk of the cork oak, *Quercus Suber*, L., brought by Mr. I. C. Russell from Morocco, and a pod of *Cassia fistula*, L., from Cuba, where the plant has been introduced from the East Indies. Mr. Brown showed a number of adventive plants gathered on the ballast grounds at Communipaw. Among these was *Richardsonia scabra*, St. Hil., (the Mexican clover), *Waltheria Americana*, L., and *Malvastrum tricuspidatum*, Gray.

Teratology.—Mr. Leggett exhibited a specimen of *Fraxinus Americana*, from Albany, in a hypertrophied condition—the terminal pedicels being swollen and distorted and the flowers entirely wanting. Miss Knight reported the detection by her of the white-flowered variety of *Campanula rotundifolia*, L., at Mount Desert Island, during the summer.

Field Meetings.—The complete report of the Committee on field meetings for the year was read and accepted. From this, the following notes are selected as worthy of record: At the meeting of June 12th, in the low grounds and woods at the base of the first Newark Mountain, *Phlox pilosa*, L., *Aristolochia Serpentaria*, L., *Euonymus Americanus*, L. (typical form), *Habenaria virescens*, Spreng., were found. On June 26th, at Little Ferry, N. J., *Aletris farinosa*, L., and a considerable quantity of a double-flowered form of *Ranunculus repens*, L., were collected. At Ridgewood, L. I., July 1st, some of the more noteworthy plants collected were *Elatine Americana*, Arnott, *Monarda fistulosa*, L., *Eriocaulon decangulare*, L., *Glyceria obtusa*, Trin., (new to Long Island), and a species of *Isoetes*. August 7th, White Plains was visited and found to be a new station for *Lechea Novae-Caesareae*, Aust., *Heliopsis laevis*, Pers., *Chamaelirium luteum*, Gray, and *Aspidium Goldianum*, Hook. On Aug. 14th, an excursion was made to Fort Lee, N. J., an old station for *Pogonia pendula*, Lindl. The plant was again detected, and in considerable quantity—both the white and purple-flowered varieties being represented. The stems of some of the plants bore as many as six flowers. On September 11th, the Club visited Huguenot, Staten Island. *Mimulus alatus*, Ait., (new to the Island), was found here, as was also the fungus, *Boletus albo-ater*, Schw., which, according to local catalogues, does not appear to have been hitherto detected since the time of Schweinitz. At this locality the members had an opportunity of observing the behavior of humble-bees in gathering nectar from *Gerardia pedicularia*, L. In no case did the insects enter

the door that was wide open to them but invariably perforated the base of the corolla (Cf. Bailey, BULLETIN, ii, p. 39). At Tenafly, N. J., Sept. 25th, *Gentiana crinita*, Froel., was found in profusion, and a single specimen of the curious fungus, *Mitremyces*, was detected. October 2nd an excursion was made to Tottenville, S. I., a locality possessing a flora similar to that of the pine barrens of New Jersey. *Opuntia Rafinesquii*, Englm., and *O. vulgaris*, Mill, were both found here, growing in the sand. It was observed that nearly all the *Pteris aquilina*, L., growing in this sandy tract had caudate pinnules, as in the variety *caudata*, Hook., of that fern. Prof. Eaton, however, to whom specimens were submitted, says he cannot regard the form as the genuine *caudata*, inasmuch as the pinnules are not nearly narrow enough. October 9th, at Woodlawn, the only plant found worthy of record was *Aster multiflorus*, Ait.

Leontodon autumnale, L.—Mr. J. D. Hyatt, in some remarks on this plant, stated that he had been much struck by its abundance in the cities and villages of the Eastern States—particularly at Boston and Newport, where it seems to be as common as is the dandelion (*Taraxacum*) with us.

Notes on the Local Flora.—Mr. Brown remarked that, under the guidance of Mr. Bower, the spot where *Cheilanthes vestita*, Swartz, was some years ago found by Mr. Denslow, was visited in August, and this fern, so rare in the State, was detected still flourishing in a little patch of about two feet square. Near it were found in abundance, *Commelyna Virginica*. L., *Stylosanthes elatior*, Swartz, and *Opuntia vulgaris*, Mill. Mr. Brown further stated that on the western border of "Train's Meadow," near Woodside, L. I., *Gentiana crinita*, Froel., *Parnassia Caroliniana*, Mich., *Spiranthes graminea*, Lindl., var., *Walteri*, Gray, and *Sorghum nutans*, Gray, are to be found in abundance. Mr. Bicknell reported the following new stations: *Prunus Pennsylvanica*, L., and *Viola pedata*, L., Var., *bicolor*, Gray, below Inwood; *Sagina procumbens*, L. and *Sparganium eurycarpum* Englm., in vicinity of Williams' Bridge; *Sabbatia chloroides*, Pursh., less than a mile north of King's Bridge; *Asclepias obtusifolia*, Michx., along Harlem River above Morris' dock; *Scirpus polyphyllus*, Vahl., by Tibbit's Brook, at city limits; *Oryzopsis melanocarpa*, Muhl., rocky woods, city limits, with *Brachyelytrum aristatum*, Beauv.; *Glyceria elongata*, Trin., Tibbit's Brook, city limits; and *Andropogon Virginicus*, L., wet meadow at tide water, about a mile north of King's Bridge.

§ 90. **Notes on the New Jersey Flora.**—During August, in the vicinity of Long Branch, the following plants were observed, at stations not, I believe, previously reported in the BULLETIN:

At Neversink Highlands, *Monarda punctata*, L., *Eupatorium album*, L., and *Quercus Prinus*, L., var. *monticola*, Michx.; the latter abundant, with acorns 15″ long and with cups perfectly conical (6″ long and broad), which Gray's Manual speaks of as not having been seen by the author in full grown specimens.

At Seabright, *Helianthus angustifolius*, L., *Habenaria tridentata*, Hook., *Botrychium ternatum*, Swartz, var *obliquum*, Milde.

At Monmouth Beach Centre, *Tripsacum dactyloides* L., and *Aster multiflorus*, Ait.

At Ocean Grove, *Quercus Phellos*, L., (tree 40 feet in height), and *Nicandra physaloides*, Gaert.

At Spring Lake, *Eryngium Virginianum*, Lam. (abundant), *Euphorbia corollata*, L., *Eupatorium pubescens*, Muhl., *Hieracium Gronovii*, L., and *Gratiola aurea*, Muhl.

ADDISON BROWN.

New York, Oct. 7th, 1880.

§ 91. **Vernation of Botrychium boreale,** Milde.—The re-discovery of *Botrychium boreale* in Unalaska by Mr. L. M. Turner, is not only a pleasing testimony to the accuracy of that distinguished cryptogamic botanist, Dr. Milde, but has been the means of placing in my hands two very fine root-specimens, and thus given me an opportunity to re-examine the vernation in this species.

In my paper on "Vernation in Botrychia," published in THE BULLETIN, January, 1878, it was stated that the description and figures of the bud in this species was based on a single specimen, and that, as the character of the bud-form in the other species had been found to be constant, it was assumed that such would prove to be the case with *B. boreale* also. But an examination of the present buds renders some modification of the previous description necessary.

The general character of the bud is the same in all three specimens, but the two buds now examined show that the appearance of the apex of the fertile portion outside of the sterile in the original bud, as shown in the published figure on the plate which accompanied my paper, was due to the manner in which that particular bud was pressed, the over-pressure having forced it out from its natural position. The oblique arrangement of the sterile segments in that bud, as shown by the dotted line through the figure cited, may also have been due, in part, at least, to the same cause, as it is less marked in the present buds. If pressed perfectly flat, however, with the fertile portion forced out of its place, these buds would correspond very well with the published figure. The apparent difference between them may be thus explained.

Since the publication of my paper, I have examined a large number of additional freshly-gathered, as well as dried specimens of *B. matricariaefolium* and *B. lanceolatum*, as well as many of *B. simplex*, and *B. Lunaria*—no specimen being allowed to pass through my hands without such an examination—in all stages of growth, and found the bud-form in those species an unvarying test-character. Whether it will prove to be so in *B. boreale*, or not, can only be determined by the examination of a larger amount of material; but it appears safe to assume, from analogy, that it will.

The bud is nearest to that of *B. Lunaria* but the apex of the sterile portion overlaps, and turns downward over the fertile further; the midrib is stouter, and the distinct character of the sterile segments is plainly to be seen. On examining the buds of the two species together, I find no difficulty in separating them. More material is needed before a permanently satisfactory description can be given.

My thanks are due to Dr. J. Schneck for so kindly contributing

to the herbarium these valuable specimens—apparently representing the forms *evolutum* and *affine* as described by Angström, and quoted by Milde in his "Botrychiorum Monographia"

GEO. E. DAVENPORT.

Dav. Herb., Oct., 1880.

§ 92. **The Herbaria and Botanical Libraries of the United States, III.**—THE HERBARIM OLNEYANUUM OF BROWN UNIVERSITY.—The herbarium of the late Col. Stephen T. Olney of Providence, R. I., was left by his will to Brown University, on condition that it be placed in a fire-proof building. It is probably known to the readers of the BULLETIN that Col. Olney was an invalid and incapacitated for business during the last years of his life. At that time the herbarium, which had been stored by the owner in Butler Exchange, was transferred by the trustees to the fire-proof library building of Brown University, the only edifice possessed by the college which would fulfil the requirements. The present writer was requested to examine and arrange the collections, which he did in connection with Mr. James L. Bennett of this city. He is greatly indebted to this gentleman for valuable suggestions and assistance which his natural neatness of method and mature experience rendered easily possible. He it was who arranged the *Carices*, (which were Col. Olney's specialty), together with the lower Cryptogams, many of which he had himself collected.

We found this elegant herbarium, one hardly surpassed by any private collection in America, badly injured by insects. The first work, then, was to poison what could be saved. It is not an exaggeration to say that one-third of the Phanerogams had suffered. In places a whole genus would be riddled by the *Anthrenus*. It was a sad sight; for the specimens had been prime, were superbly mounted, and many of them impossible to replace. Col. Olney was so neat in his methods that he disliked to see a blemish on any paper; hence his very sense of order was perhaps a means of loss. Every plant had to be thoroughly poisoned. Now that the college has come into possession, it will be necessary to throw out mutilated specimens and replace them by others. Mr. Bennett and the present writer stand ready to fill the vacancies from their own herbariums.

The collection is a fine one in every way. In Rhode Island plants it is only equalled by that of Mr. Bennett. It is very rich in Southern and Western plants of Hale, Chapman, Curtis, Ravenel, Fendler, Parry, Thurber and many other well known collectors. There is a fine set of Wright's Cuban plants, of Robin's *Potamogetons*, of Sullivant's and Austin's Mosses, etc., etc. Indeed, the owner spared no expense (and he was a wealthy man) to build up his herbarium. In the genus *Carex* it must long remain unique and classic. There is much raw material and many duplicates in *Carex*. As Col. Olney's correspondence shows him to have been in debt as regards exchanges, the writer, who now has charge of the herbarium, would be pleased to communicate with such botanists as have not received returns. He will then, acting under the direction of the college authorities, endeavor to discharge all such obligations. Col. Olney be-

queathed a fund of $10,000 for the increase of his herbarium and library. The latter, containing 712 volumes, also comes to Brown University, together with his Chevalier and Smith & Beck's microscopes and much valuable apparatus and material. With another $25,000 left by the deceased Colonel, a professorship of Natural History has been created. One of the duties of the professor is to give lectures on Botany.

In these random notes are stated only a few of the points suggested by the subject. It will be seen that Brown University has received a royal legacy, and has the nucleus upon which to build up a really fine herbarium. The present situation of the plants, while meeting the requirements of the will, is not at all what a botanist could wish. The shelves are crowded and unfit for the purpose; there is no work-room, and most of all, the books one needs for consultation are at the extreme other end of the building. These draw-backs will be rectified, no doubt, as time goes on. Our college is growing in every way, and is making especially rapid strides in science since the advent of Dr. A. S. Packard, Jr. He asks the assistance and co-operation of botanists throughout the country. Such as assist us will receive every courtesy.

Col. Olney's library contains many valuable illustrated books, together with those which are indispensable to a working systematist. It is weak in morphological and histological works, but the University is fast supplying the deficiency. The botanical correspondence covers many pages, and is carefully filed. Original letters from Torrey, Gray, Hooker, Englemann, Canby, Thurber, and a host of others, will always afford a treasure house of information.

W. W. Bailey.

Brown University, Providence, Sept. 10, 1880.

Let me add, by way of postscript, that the Providence Athenaeum now possesses many fine botanical works, and that the Public Library has requested the writer to make out a list for purchase. These, with the collections of the college, of Mr. Bennett, of Mr. Arnold Green, and the writer, afford a pretty good opportunity for useful work. W. H. B.

§ 93. **A Laminaria new to the U. S.**—In the month of August last, I collected on the coast of Maine, a *Laminaria* which I think must be the species described by Agardh in his *Species Algarum* as *L. longipes*, Bory. I have not been able to make comparison with an authentic specimen of this species, but my plant corresponds very well with Agardh's description.

The most striking character of the plant is its extreme length compared with its breadth. In what appeared to be full grown plants, the length was from one to two metres, and the breadth two to seven centimetres, the last breadth being found only in the longest and oldest plants, the tips of which had already begun to decay. I have one specimen which now, in the dry state, measures as follows: length of stipe, 12 cm.; lamina, 1 m. 45 cm.; breadth of lamina exactly 1 cm. I think such proportions have never been met with in any other *Laminaria*.

The stipe of this species is solid and quite terete, and always exceeds in length several times the breadth of the lamina. The latter is strong, and as thick as in a plant of *L. saccharina*, Lam. of the same length; is not at all wrinkled, and, with the exception of a short tapering at the base and apex, is absolutely linear, the edges for the whole length being as perfectly true as if cut by machinery.

I found this plant growing at a place known as Fox Island (though it is not an island) near the mouth of the Kennebec. The whole rock, from a short distance above low water mark to an unknown depth, was completely covered with it, no other *Laminaria* growing with it. All the other rocks in the neighborhood were covered by either *L. saccharina*, Lam., or *L. longicruris*, De la P., and I saw none of this plant among them. I also found a few fronds of *L. dermatodea*, De la P., cast up by the waves; but I saw no specimens that seemed in the least to connect the new form with any other species.

FRANK S. COLLINS.

Malden, Mass.

§ 94. **Phegopteris Dryopteris,** Fée.—Is not Hampshire Co., W. Va., a much more southerly station for this fern than has been yet reported? In June last it was growing finely and profusely on the right bank of New Creek, two miles above the junction with the Potomac.

JOHN DONNELL SMITH.

Baltimore., Oct. 27.

§ 95. **A Viviparous Grass.**—Mr. E. S. Wheeler has kindly sent me from Berlin, Mass., specimens of **Phleum pratense*, L., in which the changed appearance of the spike is so complete and so great that it would puzzle any one but an expert agrostologist to decide positively as to the species. Speaking of the metamorphoses of the floral organs of grasses into leaves, Dr. Masters (*Veg. Teratol.*, p. 168) says: "In these cases it generally happens that the outermost glumes are changed; sometimes, however, even the outer and inner paleae are wholly unchanged, while there is no trace of squamulae or of stamens and pistils within them, but in their place is a small shoot with miniature leaves arranged in the ordinary manner." The changes in the *Phleum* under consideration come under none of these categories, but agree, rather, with those observed by †Mohl in a viviparous state of *Poa alpina*, L.—a study of which, in its various stages, led him to the conclusion that the inferior palet is but a bract from whose axil the floral axis takes rise, and not, as Brown had theorized, a perianthial leaf. In the *Phleum* sent me by Mr. Wheeler, every one of the inferior palets has been transformed into a perfect leaf, with its lamina, ligule, and sheath; the latter proceeding from a joint on the

*In the *Flora of Richmond Co.*, (p. 33), this same form is said to be occasionally abundant late in the season, on Staten Island.

†*Ann. & Mag. Nat. Hist.*, Vol. XV., p. 174, from *Botanische Zeitung*, January, 1845.

slightly prolonged rachis, as seen in the accompanying sketch, in which the leaf is shown detached and raised above the glumes. On laying open one of these leaves, I find, in the majority of cases, seated on a minute prolongation of the rachis, three stamens; their immature green anthers lying side by side, and being subtended by a membranous bract having a narrow, green, minutely mucronate keel. This bract occupies the position of the superior palet; but, unlike the latter, it has a strongly pointed tip. In two instances, I detected a still further change in this bract, which, elevated yet higher within the investing sheath, had assumed the form shown at *b* in the annexed figure. Here, the structure was intermediate between that of a glume and that of the blade of a young leaf, the bract being carinate, and strongly compressed; having scarious margins, with about three veins on each side of the broad, dark green, minutely mucronate keel; and being tipped with a scabrous awn. At the base was a rudimentary sheath, and in the axil of this were seated the three stamens. The development of the sheath subsequent to the formation of the lamina in these instances is in accordance with observations already made by ‡Van Tieghem. In none of these monstrous flowers is there the least trace of ovary or of the scales which usually accompany it; but in every case the stamens are present. In the annexed figure, the metamorphosed flower is represented about double natural size; while the stamens (*a*) and the transformed superior palet (*b*) are shown magnified about four diameters.

W. R. GERARD.

§ 96. **Botanical News**—*The Color of Flowers.*—At a recent meeting of the Vaudois Society of Natural Science, says *La Nature*, Prof. Schnetzler read an interesting paper on the color of flowers. Hitherto it has generally been supposed that the various colors observed in plants were due to so many different matters—each color being a different chemical combination without relation to the others. Now, however, Prof. Schnetzler shows by experiment that when the color of a flower has been isolated by putting it in alcohol, one may, by adding an acid or an alkali, obtain all the colors which plants exhibit. Plants of paeony, for example, yield, when macerated in alcohol, a violet-red liquid. If some acid oxalate of potassa be added, the liquid becomes pure red; while soda changes it, according to the proportion used, into violet, blue, or green. In the latter case, the green liquid appears red by transmitted light, just as solution of chlorophyll does. The sepals of paeony, which are green, bordered with red, become wholly red when placed in a solution of acid oxalate (binoxalate) of potassa. These changes of color, which may be obtained at will, may quite well be produced in the plant by the same causes; since, in all plants, there always exist acid or alkaline matters. Further, it is stated that the transformation from green into red, observed in the leaves of many plants in autumn, is due to

‡*Ann. des Sci. Nat.* Ser. 5, Tome XV., 1872, p. 236.

the action of the tannin which they contain, on the chlorophyll. Thus, without desiring to affirm it absolutely, Prof. Schnetzler supposes *a priori* that there is in plants only one coloring matter—*chlorophyll*, which, being modified by certain agents, furnishes all the tints that flowers and leaves exhibit. As for white flowers, it is well known that their cells are filled with a colorless fluid, opacity being due to air contained in the numerous lacunae of the petals. On placing the latter under the receiver of an air-pump, they are seen to lose their opacity and to become transparent as the air escapes from them.

Pilosity as a Teratological Phenomenon.—Hitherto, teratologists have considered undue pilosity, or the adventitious production of hair in plants, as a matter of minor importance, but M. Ed. Heckel, in a recent note to the French Academy (*Comptes Rendus*, xci., p. 349), insists that there are certain phases of this sort of change in plants which have a higher significance than that of a simple variation. He proposes to divide the phenomenon into the following three categories:

(1.) *Physiological Pilosity*, which includes the formation of hairs, or the increase in number of these, on the parts of plants where they are normally present, or even entirely wanting. Such cases are oftenest seen when plants change their habitat from a wet to a dry soil. This sort of physiological adaptation takes place within quite narrow limits; and it varies from glabrousness to pilosity unaccompanied by any alteration of specific characters.

(2.) *Teratological Pilosity*, which begins at the moment the specific habit is altered, and acquires its maximum when the modifications are profound enough to suggest the idea of a new species. A large number of conditions capable of producing nutritive troubles in plants may give rise to this peculiar phenomenon, which M. Heckel proposes to introduce into teratological literature under the distinctive term of "Deforming Pilosity" (*Pilosisme deformant*).

(3.) *Pilosity due to the Sting of Insects or to Organic Variations*, which is clearly distinguished from the former in being very localized (e. g. certain galls, the filaments of *Verbascum* with aborted anthers, etc.,) and which cannot change the habit of the species.

Of changes due to *deforming pilosity*, M. Heckel gives two prominent examples which he has studied, *Lilium Martagon*, L., and *Genista aspalathoides*, Lam. The alterations in the last-named plant are so profound that its monstrous state has even been described by De Candolle as a species, under the name of *G. Lobelii*; while by Morris it has been regarded as a marked variety, and named by him var. *confertior*.

§ 97. **Publications.**—*Arboretum Segrezianum, Icones Selectae Arborum et Fruticum* in *Hortis Segrezianis Collectorum.* Descriptions of figures of new, rare, or critical species of the Arboretum of Segrez. By Alphonse Larallée. We are indebted to Mr. F. W. Christern for a specimen copy of *Livraison I* of this magnificent work. It contains six plates as follows: I and II. *Juglans Sieboldiana*, Maxim; III. *Ostryopsis Davidiana*, Decaisne; IV. *Elaeagnus longipes*, Gray; V. *Crataegus cuneata*, Sieb. & Zucc.; VI. *Jamesia Americana*, T. & G., Flor. N. Amer. Vol. I (*not* II) p. 593. The work will form two volumes 4to, jésus (fol. 11 x 15 inches) of 60 plates each; and there will be published every three months one *livraison*, of 6 plates with descriptive text, at 10 francs each.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. VII. New York, December, 1880. **No. 12**

§ 98. **Proceedings of the Torrey Club.**—The regular meeting of the Club was held at the Herbarium, Columbia College, Tuesday evening, November 9th, the President in the chair, and nineteen members and one visitor in attendance.

The donation to the Club's library was announced of two numbers of the *Characeae Americanae* by the author, Dr. T. F. Allen.

Plants exhibited.—Prof. Wood exhibited and remarked upon a number of specimens of plants from the North-western Territories, many of which are undescribed in American botanical works, and will probably prove to be new species. Among other interesting things was a specimen of *Aster praealtus*, a species which has long been lost sight of. Mr. Tweedy brought specimens of *Adiantum Capillus-Veneris*, L., gathered in Texas, and of *Aspidium aculeatum*, Swartz., var. *Braunii*, Koch, from Crane's Mountain, Warren County, N. Y. Miss Knight called attention to the fact that the last-mentioned fern was found by Prof. Benedict many years ago on Mount Marcy, and again in 1874 by Miss Edith Gleason, on the trail to Preston Ponds, in the Adirondack region, Essex County.

New Stations.—Mr. Bicknell gave the upper end of New York Island as a station for *Aster amethystinus*, Nutt., *Pycnanthemum Torreyi*, Benth. and *Desmodium viridiflorum*, Beck.

Albinism.—Mr. Britton reported that a white-flowered variety of *Cypripedium acaule*, Ait. had been detected the present season near Bridgeton, N. J., by Dr. J. Potter.

Large Cornus.—Mr. Britton also stated that at the last-named locality he had observed a specimen of *Cornus florida*, L., the trunk of which measured five feet and four inches in circumference.

Teratology.—Mr. Bicknell exhibited several chestnut "burs," each of which was composed of two involucres which had cohered by the edges of their contiguous valves so as to form but a single individual having six valves and enclosing seven nuts, one of which was seated directly on the line of cohesion. Mr. Bicknell also showed examples of heterophylly in the apple-tree. The leaves exhibited were nearly all deeply cut-lobed and sharply toothed, resembling those of *Crataegus coccinea*, and were taken from a tree which had run wild in the upper part of New York Island.

A Weeping Apple-tree. Mr. Britton remarked on an accidental variety of the common apple-tree which he had observed at Bridgeton, N. J., the present season, some of the pendulous and trailing branches of which were ten feet in length. The tree grew on the farm of Dr. J. B. Potter.

The President remarked at some length on the plants observed by him in the Western Territories this season, and signified his intention of exhibiting specimens to the Club as soon as they should be properly arranged.

One corresponding and two active members were elected.

§ 99. **Ballast Plants in and near New York City.**—In continuation of the lists of adventive plants found in and near this city in 1878 and 1879, previously reported in the BULLETIN (Vol. VI, pp. 256, 273, and 355), I give below the additional species found during the past season in the same localities.

The ballast grounds, however, at Hunter's Point, so fertile last year in species new to this region, and most of the grounds at Gowanus, have been almost wholly occupied for business uses, so that scarcely anything could be gathered there.

At Communipaw Ferry, also, the ballast deposits have been frequently dug up or covered; and since the middle of July a corps of laborers has been constantly employed in traversing the grounds about the railroad tracks where most of the plants were procured, and in digging up by the roots all traces of vegetation. What has been obtained there has been found during the intermission of their ravages.

At the 8th Avenue station and at 107th Street the grounds have been mainly undisturbed, as have a part of the grounds at Communipaw and Hoboken. It is somewhat remarkable that so many new species have been found this year on these old deposits, as the seeds must have been brought there with the ballast at least four years ago, and would have been noticed had they produced plants last year.

The greater part of the plants from Communipaw in the following list are, however, from *new* ballast earth used for filling about the railroad tracks, though the "wharf" before referred to has been undisturbed.

In May, and again in July, Mr. Martindale, who in previous years has collected so many ballast plants from the deposits about Philadelphia and Camden, went over our chief localities, and a number of the following species were first noticed by him as indicated in the list subjoined. I am indebted to him also as well as to Mr. Jones, at the Cambridge Herbarium, for the determination of some other species, and to Dr. Thurber for grasses.

A few corrections should be made in the list for last year.

No. 76, for *Brassica monensis* read *B. CHEIRANTHUS, Vill.

No. 117, for *Trifolium elegans* read T. HYBRIDUM.

No. 182 is *Echium vulgare*, with long spreading branches, very different in appearance from the usual form.

No. 240, for *Anthericum ramosum*, read *ASPHODELUS RAMOSUS, L. (A. microcarpus, Vis.)

Of the 258 species previously reported, upwards of 200 were found again this year; and if the species be omitted that were only found last year at the stations at Hunter's Point and Gowanus since destroyed, more than nine-tenths of last year's species re-appeared this year at the same localities.

In the following list the plants not in Gray's Manual are printed in *italics* or in small CAPITALS, the latter designating such as are not known to the writer to have been previously published as found in this country. Those not previously reported within our local limits (30 miles) are indicated by an asterisk (*); and the dagger (†) indi-

cates those which Mr. Martindale reports also from Philadelphia or Camden. The station near Communipaw Ferry is indicated by "Com."; Hoboken by "Hob."; Hunter's Point by "H. Pt.", and Gowanus by "Gow." Where not otherwise stated the plants are believed to be European. A number belong to the shores of the Mediterranean, a few are from South America, and others from the Southern or South-western States:

†259.* *Ranunculus arvensis*, L.—May–June. Com. 8th Ave.

260.* RANUNCULUS LANUGINOSUS, L.—May. Com. 1 plant only. Wharf.

†261.* Papaver Argemone, L.—May–June. 107th St., 8th Ave.

†262. Argemone Mexicana, L.—July. Com. 1 plant.

†263.* *Eschscholtzia Californica*, Cham.—June. Com. 1 plant Cal.

†264.* *Sisymbrium Irio*, L.—June–July. Com. 8th Ave.

76.* BRASSICA CHEIRANTHUS, Vill.—June–July. Hob. Abundant.

†265.* *Diplotaxis muralis*, DC.—May–July. 107th St. Same as var. *integrifolia* in former No. 75.

†266.* DIPLOTAXIS ERUCOIDES, DC.—Aug.–Oct. Com. Flowers white.

†267.* Lepidium intermedium, Gray.—May–June. Com. Western.

268.* LEPIDIUM SMITHII, Hook.—July. Com. 2 plants. (Martindale.)

269.* IONIDIUM PARVIFLORUM, (?).—Aug.–Sept. Com. So. Am.

†270.* *Dianthus barbatus*, L.—July. Com. Both white and pink flowers.

271.* SILENE ITALICA, Pers.—June–July. Com. Wharf,

272.* SILENE PENDULA, L.—July. Com. 1 plant.

†273.* *Lychnis diurna*, Sibth.—May–July. Com. Wharf. 8th Ave.

274.* *Lychnis Flos-cuculi*, L.—May. Com. Wharf. 1 plant.

†275.* *Stellaria aquatica*, Scop. (*Cerastium*, L.)—Aug.–Oct. 8th Ave.

†276.* *Corrigiola littoralis*, L.—June–Nov. Com. Spreads upon the sand like carpet-weed. An interesting addition to our few representatives of the order *Paronychieae*.

†277.* *Malvastrum tricuspidatum*, Gray.—Sept. Com. Scarce. S. W.

†278.* *Sida carpinifolia*, L., var. *brevicuspidata*, Griseb. (*S. stipulata*, Cav.)—Sept. Com. S. W.

279.* *Pavonia hastata*, Cav.—(*P. Lecontei*, T. & G.) Sept. Com. 2 plants. S. W.

280.* *Waltheria Americana*, L.—Sept. Com. Not in flower. S. W.

†281.* *Geranium molle*, L.—May. 107th St.

†282.* Geranium dissectum, L.—May. Com.

†283.* ERODIUM MALACHOIDES, Willd.—May. 107th St.

†284.* Oxalis corniculata, L.—Sept.–Oct. Com. Stipules small but evident.

†285.* ONONIS REPENS, L.—July. 107th St. Prostrate; spines 9″. *O. arvensis*, L. was also found again this year at 8th Ave. It resembles *O. repens*, but is wholly without spines.

†286.* ONONIS SPINOSA, L.—June. Hob. Sub-erect; branches spreading, rigid, thorny.

†287.* TRIGONELLA CAERULEA, Ser.—July. 8th Ave. (Martindale.)
†288.* ANTHYLLIS VULNERARIA, L.—June–July. Com. 8th Ave. Also var. *rubiflora* (*A. Dilenii*, Schultz.)
†289.* TRIFOLIUM MARITIMUM, Huds.—July. 8th Ave. (Martindale.) 1 plant.
290.* TRIFOLIUM DALMATICUM, Vis. (?).—July. 8th Ave. One plant; may be *T. tenuiflorum*, Ten.; it has the long axillary sessile heads of *T. striatum*, but the smoother, rigid leaves of *T. scabrum*, with similar beautifully-arched veinlets; plumose teeth of calyx unequal, exceeding its tube, and equalling half the rosy corolla; decumbent.
†291.* MEDICAGO MARGINATA, Willd.—July. Com. Wharf.
†292.* *Medicago falcata*, L.—July. Hob. (Martindale.)
†293.* Medicago minima, Lam.—May–Aug. Com. 8th Ave.
†294.* MELILOTUS SULCATA, Desf.—July. Com.
295.* DORYCNIUM HIRSUTUM, DC., (*Lotus*, L.)—May–June. Com. Wharf.
296.* ORNITHOPUS COMPRESSUS, L.—Sept. Com. 1 plant. S. Am.
297.* ASTRAGALUS GLYCYPHYLLOS, L.—May–Aug. Com. Wharf.
298.* ADESMIA MURICATA, DC., var. DENTATA. (?).—Aug. Com. 1 plant. Chili.
†299.* *Vigna luteola*, Benth. (*V. glabra*, Sav.)—Sept. Com. Young pods very hairy.
300.* VICIA HYBRIDA, L.—May–July. 107th St. Standard and pods hairy. Flowers yellow.
301.* *Rhyncosia minima*, DC.—Oct. Com. South.
302.* *Desmanthus brachylobus*, Benth.—Sept. Com. W.
†303.* *Poterium Sanguisorba*, L.—June–Aug. 8th Ave. Com.
†304.* *Alchemilla arvensis*, Scop.—H. Pt. (J. Schrenk, 1879.)
305.* *Potentilla recta*, L.—July. 8th Ave. (Martindale.)
306.* *Apium leptophyllum*, F. Muell. (*Helosciadium*, DC.) Com. S.W.
307.* HERACLEUM SPONDYLIUM, L.—July. 8th Ave.
†308.* *Anethum graveolens*, L.—July. 8th Ave.
309.* CHAEROPHYLLUM TEMULUM, L.—June–July. Com.
†310.* *Scandix Pecten-Veneris*, L. May. Com. (Martindale.)
†311.* GALIUM PALUSTRE, L.—July. 8th Ave.
†312.* *Richardsonia scabra*, St. Hil.—Aug.–Sept. Com. S. Am.
†313. Fedia olitoria, Vahl.—May. 8th Ave.
†314. Dipsacus sylvestris, Mill.—July. 8th Ave.
314*a*.* BUPHTHALMUM SALICIFOLIUM, L.—July. Hob. 1 plant. Shortly afterwards plants all cut down.
†315.* Eclipta erecta, L.—July. Com. Quite erect. South. 3°.
†316.* *Acanthospermum hispidum*, DC.—July–Aug. Com. South.
†317. Achillea Ptarmica, L.—July. Com. Scarce.
318.* CENTAUREA PHRYGIA, L.—July. Com. Appendages very long recurved fimbriate.
†319.* *Senecio Jacobaea*, L.—July–Aug. 8th Ave. Hob. (Martindale).
†320. Onopordon acanthium, L.—July. 8th Ave. Hob. (Martindale).

†321.* *Carduus acanthoides*, L.—July–Aug. 8th Ave. Hob. (Martindale).
322.* CARDUUS CRISPUS, L.—July. 8th Ave.
323.* CARDUUS MULTIFLORUS, Gaud.—July–Aug. Gow.
172.* HIERACIUM UMBELLATUM, L.—Aug. Com. 1 plant. No. 172 of last year.
†324.* *Picris hieracioides*, L.—July. Com. Wharf. (Martindale).
†325.* *Scolymus Hispanicus*, L.—July. H. Pt. Hob.
†326.* *Heliotropium Curassavicum*, L.—July–Oct. Com.
†327.* *Heliotropium anchusaefolium*, Poir.—July–Aug. Com.
†328.* *Heliotropium Indicum*, L.—June. Com.
†329.* BORRAGO OFFICINALIS, L.—July. 8th Ave. 1 plant.
†330.* MYOSOTIS COLLINA, Hoff. (*M. hispida*, Schlecht.)—Aug. Com.
†331.* *Myosotis arvensis*, Hoff. (*M. intermedia*, Link)—Aug. Com.
†332. Symphytum officinale, L.—July. Com. Hob. The latter with purple flowers.
333.* *Dichondra repens*, Forst.—Sept. Com. Not in flower. S.
†334. Ipomoea coccinea, L. (*Quamoclit*, Moench.) Sept. Com. South.
†335.* *Ipomoea commutata*, R. & S.—Oct. Com. South.
†336. Solanum nigrum, var. Dillenii, Gray (sp. Schult.)—Sept.–Oct. Com.
†337.* *Solanum sisymbriifolium*, Lam.—July. 8th Ave. Gow. Also in 1879. South.
338. Solanum tuberosum (?)—July–Oct. Com. Perfectly regular leaflets, filamentary white roots, no tubers. West.
†339.* *Hyoscyamus albus*, L.—July. Com. (Martindale).
340* DIGITALIS LUTEA, L.—July. 8th Ave. 1 plant.
†341.* *Scoparia flava*, C. & S.—Sept. Com. 2 plants. So. Am.
†342. Veronica hederaefolia, L.—May–Aug. 8th Ave. Hob. Com.
†343.* *Orobanche minor*, Sutt.—May. 107th St. 1 plant.
344.* AJUGA GENEVENSIS, L.—May–June. 107th St. Scarce.
†345. Origanum vulgare, L.—Aug.–Sept. 8th Ave.
†346.* *Salvia verbenaca*, L.—Aug. Com. 1 plant.
†347.* *Galeopsis angustifolia*, Ehrh. (*G. Lad.* var. *ang.*)—July–Oct. 8th Ave. Abundant.
348.* GALEOPSIS VERSICOLOR, Curt.—July. Com.
†349.* STACHYS RECTA, L.—July–Aug. Com. Wharf. (Martindale.)
†350.* *Plantago coronopus*, L.—June. Gow.
†351.* *Amarantus blitoides*, Watson.—July. 8th Ave. (Martindale.)
352.* *Cladothrix lanuginosa*, Moq. (*Alternanthera*, DC.)—July–Sept. Com. S. W.
353. Polygonum ramosissimum, Michx.—July. 8th Avenue. (Martindale.)
†354.* *Phyllanthus polygonoides*, Spreng.—Sept. Com. Mex.
†355.* CYPERUS UMBELLATUS, Vahl.—Sept. Com. China?
†456.* Carex hirta, L.—May. 8th Ave. (Martindale.)
357.* PHLEUM ARENARIUM, L.—May. 8th Ave. (Martindale).
†358.* *Sporobolus Indicus*, Br.—Sept. Com.
359. Eleusine Indica, var. *BRACHYSTACHYS, Trin.—Sept. Com.

360.* GLYCERIA PROCUMBENS, Sm.—June. 8th Ave.
361. Poa trivialis, L.—May. 107th St.
†362.* Festuca Myurus, L.—May. 107th St.
†363.* *Hordeum murinum*, L.—July. Com. 8th Ave.
364.* *Paspalum distichum*, L.—June-Aug. Com. So.
365.* Equisetum variegatum, Schlecht.—June. Com.

New York, Dec. 3, 1880. ADDISON BROWN.

§ 100. **The Value of Herbaria.**—The following extracts from *La Phytographie par Alph. De Candolle, Paris*, 1880, merit the consideration of those who may have it in their power to promote the growth of our public collections of dried plants:

The purposes of Herbaria are to acquaint us with the exact names of plants, to furnish the materials necessary for their description, and to preserve the evidences or explanations in regard to descriptions already published.

Collections of this nature are superior to those we can have in Zoology. Dried plants are in a condition of completeness or nearly so, whereas shells, skeletons or stuffed animals exhibit merely certain portions of the organism. They have usually several flowers or fruit, and these admit of additional dissection for their verification. Specimens are so little altered in drying, that it is easy by means of a simple immersion to view the most minute and delicate organs. In certain cases we see them even better than in the living plant; as for instance when we examine ovules involved in a pulpy substance, or membranes that become very nicely separated by desiccation.

If we compare collections of dried plants with those of living ones, the respective advantages are more evenly balanced than is generally supposed. In a Herbarium we see simultaneously specimens of neighboring species, and of those from different localities; also specimens of different ages, or of different states of the same species. We know the name of the plant if the collection has been well determined, and are referred directly to the authors who have spoken of it. We are sure of its place of origin, as it is indicated on the label. The living plant, on the other hand, affords more opportunities for certain anatomical observations; it admits of a better description of some characters of little importance, such as color, odor, etc. But plants in the field and forest are not named, and in Botanical Gardens they are often very badly named. The geographical origin of their plants is almost always uncertain or unknown. Individuals are often modified by cultivation and by hybridation; seldom can we see fruit along with the flower; seldom numerous individuals of the same species; and more seldom still is a botanist permitted to gather sufficient specimens of an exotic plant, so that he can examine it as he would, and can preserve the evidences to substantiate his work.

When we reflect upon these differences, we are surprised to see so much lukewarmness shown by anatomists and physiologists to all that concerns Herbaria. Without their aid these gentlemen could not be sure of the name of any plants except the most common ones. They go

at hap-hazard from one species to another, from one genus to another, without being advised of their affinities by classification and the view of numerous specimens, such as are to be found in a Herbarium. They can themselves testify, how much more considerable an amount of work has been done in the Herbarium than in the Gardens, and that, too, in regard to microscopic organs, such as pollen, ovules, embryos, archegonia or spores. Without Herbaria we should not have had, at this moment, either good general treatises or good floras; and published descriptions would have been without material evidences, just as are those in the works of Rumphius and Plumier, skilful naturalists though they were. It would have been just as it is with a good many of the observations made with the microscope: the elements for such observations, obtained by some happy section, have ceased to exist.

The indifference of public administrative bodies in regard to Herbaria is as extraordinary as is that of anatomists and physiologists, when we consider how small is the cost of collections of this nature, as compared with that of Gardens. This comparison has never been been made, and it is worth while to say a few words on the subject.

Leaving out of view the cost of ground and buildings, which is however insignificant for a Herbarium, but considerable for a Botanical Garden, let us look merely at the relative expense of keeping up the two kinds of collections. An extensive private Herbarium costs on an average only 3,000 or 4,000 francs a year for purchase of plants, paper and other materials, and for the salary of a custodian employed during a portion of the day. A public Herbarium of corresponding importance, more completely accessible to botanists, and consequently having more *employés*, and directed by a professor, a portion of whose salary should be charged, costs or ought to cost say 10,000 francs per annum. The great majority of public Herbaria do not cost so much; and this may be perceived from their pitiable condition. There are perhaps not ten public Herbaria in the world with resources sufficient for a proper increase, and for a good arrangement of what they have. Perhaps all the public Herbaria of the five parts of the world do not cost altogether in their present condition more than 200,000 francs a year. And yet it is with this that nine-tenths of all the good work in descriptive botany has been done, and horticulturists, anatomists and physiologists have been furnished with the means of knowing the exact names of plants, and of making those researches, for which *exsiccatae* are particularly suited.

A Botanical Garden of moderate size costs not less than 4–5,000 francs a year. Many others take 10–15,000 francs, and the extensive Gardens, which may be compared with the grand Herbaria, expend as much as 60–80 or 100,000 francs annually. Take a list of the one hundred most important Botanical Gardens, beginning with those of Kew, Paris, Buitenzorg, Calcutta, St. Petersburg, &c., then those attached to universities, and finally others in places without universities, the average annual expense would be at least 15,000 francs for each establishment, or one and a half million francs for the hundred Gardens. The total number of these Gardens being greater than one

hundred, it is probable that there is expended for the keeping of living plants, a part of which die each year, nearly two million francs per annum. Deduct what is proper to be charged to the amusement of the public and the instruction of students, there still remains an expenditure five times greater than that for Herbaria, and all for a vastly inferior scientific result.*

If governments could only agree to devote to the *Hortus siccus* a portion of the sum they apply to Botanical Gardens, a singular impulse would be given to Botany. By promising, for instance, to purchase collections of *exsiccatae* from countries not yet explored, they would advance the knowledge of all the plants of our epoch, in the double point of their nature and of their geographical distribution. A few thousand francs appropriated to Herbaria, on the part of which there might be an engagement to perform a certain amount of work in the way of arrangement and of determination, would cause many an existing collection to emerge from its present chaotic condition. Anatomists, physiologists, horticulturists and directors of Botanic Gardens could at least determine plants with certainty and without too great trouble; but, above all, authors of floras and of monographs would be able to work with good materials, and would give us fewer of those deplorable descriptions that I have characterized as enigmatical.

§ 101. **Double Flowers.**—M. Heckel, in a note to the Academy (*Comptes Rendus* Oct. 4th, p. 581) attributes the formation of double flowers, through petaloid development of the stamens, to long-continued self-fertilization. His observations have been made on *Convolvulus arvensis*, L., the flowers of which vary from deep rose-color, through white with purplish markings, to immaculate white. He regards the last named (pure white) as an example of the Darwinian idea that flowers lose their color through close fertilization. The two white varieties observed by M. Heckel were found to have a frequent tendency to be affected with petalody of the stamens. Believing this to be due to the same cause, close-fertilization, he undertook a series of experiments on the plant, extending over a period of three years. The results reached are in perfect accordance with the opinion that he had formed, the third generation of the plants giving him an abundance of double flowers. While M. Heckel's observations are important, it cannot be that double flowers are wholly due to the causes he adduces, since we have numerous examples of such among insect-fertilized flowers, of which the rose furnishes a conspicuous example.

*The author elsewhere compares the value of plates, engravings, &c., with that of dried specimens, and gives the following statistics of their relative cost:

The number of botanical plates in existence exceeds 120,000, and they have cost at least twenty-four million francs. This is the valuation of the *stock* deposited in libraries! Have the results been commensurate with this vast expenditure? I will leave it to each one to answer this question according to his own ideas. But as a term for the comparison, I will add, that a very rich Herbarium, of one hundred thousand species and one million specimens, does not represent more than 3 or 400,000 francs of successive expenditures. Seven or eight hundred Herbaria, equal in size to the best twenty in existence, would represent the same cost as the plates.